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INTENSIFICATION CREDIT AS AN ADJUSTMENT VEHICLE FOR THE LOW-INCOME FARMER

A Thesis Submitted

to the

Faculty of Graduate Studies

in

Partial Fulfillment of the Requirements

for the

Degree of Master of Science

in the

Department of Agricultural Economics

University of Saskatchewan

by

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Saskatoon, Saskatchewan

April, 1965

ACKNOWLEDGMENTS

The author wishes to acknowledge the guidance and very patient assistance of Dr. P. J. Thair, under whose supervision this thesis was written. The helpful suggestions and assistance of Professor H. Van Vliet and Dr. R. C. Nicholson are gratefully acknowledged.

Thanks are also due to Mr. George Lee for his invaluable assistance in the linear programming requirements, and to Mr. L. J. Hutchison and Mr. A. J. Webster, without whose "encouragement", this manuscript would not have reached completion.

TABLE OF CONTENTS

TABLE OF CONTENTS - Continued

TABLE OF CONTENTS - Continued

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

1.1 Introduction to the Problem

The Saskatchewan agricultural industry as reported in the 1961 Census, consisted of 93, 924 farm units.[1/] Of this number, a large percentage must be classified as "uneconomic" in the sense that the return from land, labor and capital is invariably too low to ensure a satisfactory standard of family living. This low-income farm situation is not new to agriculture. It has existed over the years chiefly because of the failure of many operators and their families to adjust to the changing needs of efficient agricultural production. In order that the low-income farmers remaining on the farm might increase their net income however, they must be able to adjust through some combination of increased land base, increased production on present land or increased efficiency of land, labor and capital use.

Although increased efficiency of resource use may offer promise of additional net returns for many farmers, the needed volume of income adjustment can for the most part, only be met through expanding the overall scale of production. This expanded production, however, whether by means of additional land or through more intensive land use, requires substantial amounts of extra capital. By restricting family living expenditures, an established farmer can often accumulate much of this capital needed for further expansion. The low-income farmer, on the other hand,

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1/ A farm, as defined for purposes of the 1961 Census, consists of an agricultural holding comprising one or more acres, and having sales of agricultural products during the 12 months of $50 or more.

cannot adjust in so ready a fashion. With family living standards already too low, he can scarcely hope to accumulate sufficient savings to finance his own adjustment. He must instead, look to credit as the means by which his production and hence income, can be increased.

Credit is an important key in meeting the adjustment needs of the low-income farmer; as such, it is the central problem of this study. Despite the need for substantial amounts of credit, the low-income farmer is the least able to qualify for assistance from present lending agencies. This is due in large measure to the fact that credit institutions rely heavily on large amounts of collateral security as the basis for extending loans to farmers. Since the low-income farmer has little to offer in the line of first class security, he is denied the one means by which he could hope to increase his production and hence his standard of family living. Such credit as is currently available, has not been designed to assist the low-income farmer to gain an economic status. The short-comings become even more important as changing agricultural conditions suggest the need for still greater quantities of capital on behalf of today's farmer.

1.2 The Low-Income Farmer Situation

Some appreciation of the magnitude of the low-income farmer situation in Saskatchewan can be had by reference to data reported in the 1961 Census of Canada. Table 1 indicates the distribution of Saskatchewan farmers in 1961 by size of farm and value of products sold. An examination of this table reveals that 32.3 percent of Saskatchewan farmers in 1961 sold less than $2,500 of farm products during the year. This compares to only 9.5 percent of farms reporting gross sales of $10,000 or more.

Table 1

Farm Numbers by Value of Products Sold and Size of Farm, Saskatchewan, 1961 *

Size of Farm (Total Acres)	Total, All Census Farms	Value of Products Sold $ 0 to 1,200	$ 1,200 to 2,499	$ 2,500 to 3,749	$ 3,750 to 4,999	$ 5,000 to 9,999	$ 10,000 to 14,999	$ 15,000 to 24,999	$ 25,000 & over
		No. of farmers							
Under 3 Acres	128	92	20	9	3	3	-	1	-
3 - 9 Acres	262	180	25	18	4	17	1	9	8
10 - 69 Acres	829	632	94	26	21	23	11	11	11
70 - 239 Acres	10860	5590	4054	786	238	148	23	10	11
240 - 399 Acres	20977	3331	7527	5954	2512	1537	82	20	14
400 - 559 Acres	17665	1047	3741	4792	3773	4018	243	37	14
560 - 759 Acres	15676	379	1871	3005	3288	6333	673	101	26
760 - 1119 Acres	15499	157	1071	1858	2417	7630	1937	354	75
1120 - 1599 Acres	7445	45	239	476	735	3278	1894	698	80
1600 - 2239 Acres	2775	26	66	110	163	919	745	601	125
2240 - 2879 Acres	826	14	17	21	42	207	202	233	90
2880 Acres & over	1002	146	14	13	31	177	170	224	227
Total Farms	93924	11639	18739	17068	13227	24290	5981	2299	681

* 1961 Census of Canada, Agriculture, Saskatchewan, Dominion Bureau of Statistics, Bulletin 5.3-2 (Ottawa, 1963), P.31-1,2.

Size of farm in total acres is one of several measurements used to estimate a farm's income producing ability. Using this as an indication of a farm's earning power, it can be seen from Table 1 that 54 percent of Saskatchewan farms in 1961 were less than 560 acres in total size. Approximately one-third (35.2 percent) of all farms had less than 400 total acres. The average Saskatchewan farm, on the other hand, contained 686 total acres in 1961.[2/]

Farm size (and subsequent income potential) can also be measured by such indicators as size of farm in improved acres, and value of capital with respect to land and buildings, machinery and equipment, and livestock and poultry. Table 2 outlines these size characteristics as based on the 1961 Census.

Table 2

Farm Numbers by Level of Capital Investment and Size of Farm, Saskatchewan, 1961*

Size of Farm (Improved Acres)	Total, All Census Farms	Level of Capital Investment $ 0 to 9,949	$ 9,950 to 14,949	$ 14,950 to 24,949	$ 24,950 to 49,949	$ 49,950 to 99,949	$ 99,950 and over
		No. of farmers					
Under 3 Acres	642	423	81	51	40	22	25
3 - 9 Acres	506	341	79	46	28	10	2
10 - 69 Acres	2309	1844	251	129	57	21	7
70 - 129 Acres	5,761	3855	1285	500	99	12	10
130 - 179 Acres	8052	3538	2673	1598	214	24	5
180 - 239 Acres	7856	1233	2423	3336	801	50	13
240 - 399 Acres	24990	1625	4093	11009	7922	309	32
400 - 559 Acres	16787	181	891	4379	9965	1334	37
560 - 759 Acres	12787	43	169	1493	7990	3029	63
760 - 1119 Acres	9571	8	35	337	4209	4751	231
1120 - 1599 Acres	3382	-	1	20	556	2292	513
1600 Acres & Over	1281	-	-	6	44	531	700
Total Farms	93924	13091	11981	22904	31925	12385	1638

* 1961 Census of Canada, Agriculture, Saskatchewan, Dominion Bureau of Statistics, Bulletin 5.3-2 (Ottawa, 1963), P.34-1,2.

2/ 1961 Census of Canada, Agriculture, Saskatchewan, Dominion Bureau of Statistics, Bulletin 5.3-2 (Ottawa, 1963), P.2-1,2.

When viewed from the standpoint of total capital investment, 26.7 percent of Saskatchewan farmers had less than $14,950 invested in land, buildings, machinery and livestock. Slightly less than half of the farmers (48.9 percent) had a capital investment exceeding $24,950 while only 14.9 percent had $49,950 or over. This compares with an average investment of $30,496 for all farmers in 1961.[3/]

Size of farm by improved acres serves further to point out the lack of adequate scale (and thus income) for many farmers. Only 46.6 percent of all farms had an improved acreage of greater than 400 acres while less than 16 percent could claim an improved acreage exceeding 760 acres. This situation can be compared with the provincial average figure of 459 improved acres out of an average of 686 total acres per farm.[4/]

Viewed in the light of total acres, cultivated acres, and value of farm capital, a skewed distribution is readily apparent. A disproportionately larger number of farms fall below these measures of size, than exceed the average for the province. For example, only 28.8 percent of the farms in Table 2 fall into a higher improved acreage bracket as compared to 53.3 percent that fall below this bracket. A similar situation exists for total capital investment. With the provincial average standing at $30,496, less than 15 percent of the farms fall into higher brackets while over 51 percent are in the lower capital investment brackets.

With the size of the average Saskatchewan farm being weighted considerably upward by a relatively small number of larger farms, it follows

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3/ Ibid., P.2-1, 2.

4/ Ibid., P.2-1, 2.

that the average farm income picture for the province will be similarly misleading. Table 3 provides an estimate of gross and net income for the average Saskatchewan farm as experienced during the period from 1952 to 1961. The ten year average net income of $3,078 represents the allowance for family living after cash expenses and depreciation have been charged. Although this average figure is low in comparison to urban income levels, it can be assumed to be significantly higher than the level experienced by the majority of farms falling below the average in terms of acreage and capital investment.

Table 3

Estimated Average Gross Income and
Net Income, Saskatchewan, 1952 to 1961*

Year	Gross Income a/	Net Farm Income b/	Net Income as % of Gross	Estimated No. of Farms
	$	$	%	
1952	8,150	5,302	65.1	110,293
1953	7,418	4,609	62.1	108,568
1954	4,010	1,355	33.8	106,843
1955	6,067	3,175	52.3	105,118
1956	7,301	4,244	58.1	103,391
1957	4,825	1,806	37.4	101,498
1958	5,595	2,461	44.0	99,605
1959	5,742	2,465	42.9	97,712
1960	7,399	3,892	52.6	95,819
1961	4,857	1,467	30.2	93,924
10 year average	6,136	3,078	50.2	102,277

* Based on information obtained from the Supervisor of Statistics, Saskatchewan Department of Agriculture. Average annual returns per farm were computed by dividing total returns by the estimated number of farms each year as based on straight line interpolation.

a / Gross income refers to cash income from sale of farm products plus income in kind, plus supplementary payments, plus value of inventory changes.

b / Net income refers to gross income less operating expenses and depreciation

Detailed information is not available as to income by size of farm. In Table 4, however, an estimate is given for average cash income and average gross income by size of farm in total acres. An estimate was made of the average number of farmers in each size group for the 10 year period from 1952 to 1961, using straight-line interpolation between census years. Income data obtained from the Dominion Bureau of Statistics for the same period were then arbitrarily allocated to each size group.[5/] Dividing the total income accruing to each size group by the estimated number of farmers in the group provided an estimate of average returns per farmer within each size group over the 10 year period.

Although the income figures in Table 4 are at best, rough estimates, they add still further background to the low-income farm situation. On the basis of these figures, 60.7 percent of the farmers received less than $5,395 gross income while only 3.6 percent enjoyed average gross incomes of over $12,343 per year. During the 10 year period, net income as a percent of gross income for all farms was indicated at 50.2 percent in Table 3. Using this ratio to estimate net income, only 23.6 percent of the farmers had an average net income in excess of $3,520 per year; less than 3.6 percent could boast an average net income over $6,200 per year.

5/ Compiled from data received from the Supervisor of Statistics, Saskatchewan Department of Agriculture.

Table 4

Estimated Average Cash and Gross Income Per Farm, by Size in Total Acres, Saskatchewan, 1952 to 1961

	Size of Farm in Total Acres									
	Under 70	70 to 239	240 to 399	400 to 559	560 to 759	760 to 1119	1120 to 1599	1600 to 2239	2240 to 2879	2880 & over
	$	$	$	$	$	$	$	$	$	$
Cash Income - Crops a/	231	1029	2348	3522	4875	6554	9012	11515	12970	10235
Cash Income - Livestock b/	792	588	943	1271	1477	1858	2448	3554	4938	11547
Cash Income - Misc. Produce c/	14	37	58	88	118	177	271	411	600	980
Average Cash Income	1037	1654	3349	4881	6470	8589	11731	15480	18508	22762
Income in Kind d/	520	390	435	474	481	494	500	514	498	466
Supplementory Payments e/	8	34	78	116	161	217	297	383	438	323
Inventory Changes f/	-16	-26	-53	-77	-102	-135	-185	-243	-287	-357
Average Gross Income	1549	2052	3809	5394	7010	9165	12343	16134	19157	23194
Av. No. of Farmers/Group	1730	14927	26232	19672	16240	14187	6436	2208	665	814

a/ Allocated according to the average acreage in wheat, coarse grains, and flax within each size group as reported in the 1951, 1956 and 1961 Census.

b/ Allocated according to average population of cattle, pigs, sheep and poultry within each size group as reported in the 1951, 1956 and 1961 Census.

c/ Allocated according to income received from crops for each size group.

d/ Allocated according to the average percentage of farmers resident on the farm within each size group as reported in the 1956 and 1961 Census.

e/ Supplementary payments were distributed on the basis of cash income from crops.

f/ Inventory changes were allocated in proportion to average cash income per group.

The low-income farmer situation is not a static condition. Rising costs of production balanced against unstable farm commodity prices and yields (the cost-price squeeze) have combined to bring continuing pressure to bear on the low-income farmer. Because of these changing factors affecting income, many of the marginally efficient farmers of today may be destined to become the low-income farmers of tomorrow. Although they may be able to maintain a constant level of net income, their position relative to more progressive farmers and the rest of the economy will become progressively worse. A continuous state of technological and economic adjustment is necessary to maintain or improve present income levels, and to upgrade living standards in line with the rest of the economy. Some indication of the seriousness of the "cost-price" squeeze as it affects the low-income farmer can be seen from the presentation of cost of production and farm product indexes outlined in Table 5.

Table 5

Cost of Production and Farm Product Indexes, 1951 to 1962

Year	Index Numbers of Farm Prices of Agricultural Products - Saskatchewan (1935 - 39 = 100) a/	Composite Index, Exclusive of Living Component, of Commodities and Services Used by Farmers in Western Canada. (1935 - 39 = 100) b/
1951	268.7	225.5
1952	245.9	238.6
1953	228.7	237.3
1954	208.7	235.7
1955	203.5	234.7
1956	208.5	243.3
1957	201.6	251.0
1958	214.5	257.5
1959	218.6	265.8
1960	224.6	272.9
1961	251.3	277.8
1962	247.7	285.3

a/ Index Numbers of Farm Prices of Agricultural Products, Dominion Bureau of Statistics, Ottawa, Catalogue No. 62-003, P. 3.

b/ Price Index Numbers of Commodities and Services Used by Farmers, Dominion Bureau of Statistics, Catalogue No. 62-004, P. 2.

It has previously been asserted that increased capital is a major requirement for improving the low-income farmer situation. How readily can this capital be accumulated through the farmer's own savings? Modern demands for family living draw heavily on available farm income. For many low-income farmers, there is far too little income left for family living after meeting expenses, much less any income for expansion purposes. Records kept by farm management club members for the four year period from 1960 to 1963 give some indication of the annual outlay for living expenses, taking into consideration both size of family and size of farm. These data are presented in Table 6.

Table 6

Cash Living Expenses, Farm Management Club Members, Saskatchewan, 1960 to 1963*

	Size of Farm by Total Investment		
No. of Members in Family	0 to $29,999	$30,000 to $59,999	$60,000 and over
	Cash living expenses a/		
	$	$	$
2 members	1,148	1,586	1,792
3 members	1,149	2,012	2,604
4 members	1,284	1,928	2,876
5 members	1,432	1,921	2,772
6 members	1,062	2,175	2,850
Over 6 members	1,835	2,232	3,208

* Saskatchewan Farm Business Summary, Five Year Average, 1959 - 1963, Farm Management Division, Agricultural Representative Branch, Saskatchewan Department of Agriculture, Regina, 1964, P. 36.

a/ Cash living expenses include purchase of food and groceries, clothing and personal effects, medical and dental bills, education and recreational outlays, and expenses for household operation.

As might be expected, family living expenses indicated in Table 6 vary in proportion to the size of the family. The fact that these costs also vary directly with the size of the farm suggests that the lower size groups may be hard pressed to gain enough income to provide more than the basic essentials of living. A comparison of the cash living expenditures for even the small size group ($0 to $29,999) with the net income figures estimated by size of farm in Table 4, however, indicate the difficulty encountered by the low-income farmers in caring for family needs, let alone trying to finance further expansion through internal capital formation.

1.3 The Problem

Three processes were outlined by which the low-income farmer could hope to increase his income. The first of these alternatives, extensification, is used in the context of adding more land to the present unit. Increased returns would be the result of a greater volume of production, with a further potential for increased income from a more efficient use of resources through added scale. The second alternative for increased income is usually referred to as intensification. Under this adjustment, land is assumed to be held constant, but put to a much more intensive use through the addition of more complete cropping and livestock programs. A final form of income adjustment can be had in varying degrees through simply increasing the efficiency with which present resources are used. No extra land, labor or capital is required under this adjustment, assuming changes in techniques can be made with present resources. Income is increased by obtaining a better combination of livestock and cropping practices to pick up added production and lower costs per unit of production.

An improved combination of available land, labor, and capital can no doubt add to net returns for many of the low-income farmers. Basically, however, the income adjustment needs can be met only by adding to the land base or by providing for more intensive use of present land and labor. Both or a combination of these alternatives require substantial amounts of added capital. The low standard of family living already experienced by the low-income farmer, however, makes it very difficult to obtain this needed capital through savings. Credit is needed and in substantial amounts. Herein lies the problem: present credit sources in the province are not designed to meet the needs of the low-income farmer. More specifically, present credit programs are of limited use to the low-income farmer because of the following reasons:

1. Loans available for the purchase of real estate are based on the appraised value of the real estate. This appraised value is usually significantly lower than the market price of the real estate. As a result, the farmer must either put up cash for the difference, or pledge owned land as security to cover the difference. Since the low-income farmer has little to offer in the line of either cash or land of his own, he often cannot obtain a large enough loan to purchase additional land.

2. Most credit agencies making loans for the purchase of land, require that the resulting unit meet the test of being an "economic unit". Even where a low-income farmer can pledge sufficient of his own security to obtain additional land, he may still be refused the necessary credit because the expansion will be considered too small to give him an "economic unit".

3. Loans for intensification purposes, as apart from land purchases, are characterized by short repayment terms and substantial requirements insofar as operator equity. In order to qualify for a loan to purchase livestock, machinery, operating inputs, etc., a farmer must be prepared to put up a substantial amount of cash to meet the purchase price over and above the loan available. Since security is usually taken only on the asset purchased, the farmer cannot pledge other assets to take the place of the cash downpayment. Also, since the production loans are for relatively short periods, the farmer may have to deplete his family living standards even further in order to repay the loan within the specified period of time.

4. Little or no provision is made for management assistance, particularly in the case of loans for intensification purposes. Without management assistance, many of the low-income farmers cannot use the loan to its best advantage and thus further jeopardize their repayment ability.

The foregoing limitations of conventional credit with respect to the needs of the low-income farmer can be studied in closer detail through an examination of present credit institutions. Credit available to the Saskatchewan farmer is usually described in terms of the time period available for repayment,- this being short, intermediate and long term. Table 7 outlines the relevant features of those agencies providing mainly for the purchase of farm real estate. Intermediate and short-term credit provisions are outlined in Table 8.

Table 7

Long Term Credit Provisions, Saskatchewan, 1964

Item	Credit Institutions: Farm Credit Corporation a/	Family Farm Credit Act b/ (Co-op Trust Co. Ltd.)	Veteran's Land Act c/
Maximum Loan Available	Part II Loan - $40,000 Part III Loan - $55,000	$25,000	Part I Loans - $6,000 Part III Loans - $20,000
Loan as % of Appraised Value of Security	Part II - 75% of land Part III - 75% of real estate, basic herd livestock, and necessary farm equipment.	80% of real estate, livestock, and farm equipment.	Part III - 75% of land, equipment, basic herd livestock.
Maximum Repayment Term	30 years	30 years	30 years
Interest Rate	Part II - 5% for first $20,000 Part III - 5% for first $27,500 6-3/8% on loans over the above stated amount	6-1/2% which includes insurance on unpaid balance.	Part I loans - 3-1/2% simple interest Part III loans- 5% simple interest
Supervision Provision	Supervision mandatory for Part III loan in initial stages	Supervision if in arrears	Considerable supervision regarding production practices and management decisions

a/ Credit for Profit, Farm Credit Corporation, Ottawa, 1964.

b/ Credit for Family Farms, Department of Co-operation and Co-operative Development, Regina, 1964.

c/ Annual Report, Department of Veterans Affairs, 1962-63, The Queen's Printer, Ottawa, 1963, Pp. 39, 40.

Although the credit agencies indicated in Table 7 virtually exhaust present long-term commercial credit supplies, there is a limited re-entry into the long-term credit field on behalf of private investment companies. Prudential Insurance Co. Ltd., for example, has recently provided for loans on the better soil areas of the province.[6/] Size of the loans vary with the borrower, but in general start at $30,000. The interest rate is currently 7% with a 20 year repayment term. By and large, however, credit from the private lending agencies is available only for the well established farm units within the better soil areas of the province.

One of the chief problems faced by the low-income farmer with regard to credit for land purchases, is the relatively low lending value in relation to market values. The Part II Loan under the Farm Credit Corporation, for instance, allows loans based on 75 percent of the appraised value of land. Typically, however, the average appraised value placed on land by the Farm Credit Corporation runs considerably below the present market value. This means that the farmer must provide cash or additional security for the difference between the market value of the land and the 75 percent loaning value based on what the Farm Credit Corporation appraises the land to be worth. A similar situation exists with regard to loans made by the Co-op Trust Co. Ltd. and the Veteran's Land Act. The conservative loan values as a percent of market value are prompted by the current policy requiring a substantial asset margin in the event of loan forfeiture. However sound this policy may be from the standpoint of safeguarding lending losses, it does little to help the low-income farmer who may have little more to offer for security than a good character reference and a strong back.

6/ Based on information received from the Loaning Department, Prudential Insurance Co. Ltd., Regina, Saskatchewan.

Table 8

Intermediate and Short Term Credit Provisions, Saskatchewan, 1964 *

Item	Farm Improvement Loans Act	Credit Institutions General Bank Loans	Credit Union Loans	Finance Co. & Dealers Credit
Maximum Loan Available	$15,000	At discretion of lender	At discretion of lender	At discretion of lender
Security taken and Loan as Percentage of Appraised Value of Security	Security on item purchased from 60% on second-hand mach. to 90% on buildings	At discretion of lender. No land mortgages can be taken.	At discretion of lender. Security on land, buildings, and other chattels.	At discretion of lender
Maximum Repayment Term	Varies from 3 years on implements to 10 years on buildings	Usually 1 to 3 years	Depending on purpose	Usually 1 to 3 years
Interest Rate	5% simple interest	Usually 6-7%, higher if monthly finance plan used.	Usually from 7% to maximum of 1% per month	Variable interest rate - may vary from 2 to 6 times conventional rate
Supervision Provision	None	None	None	None

* Based on a summary of credit sources in the Guide to Farm Practice in Saskatchewan, 1963, published under Authority of the Saskatchewan Co-operative Agricultural Extension Program, Pp. 186, 187.

Present forms of short and intermediate term credit are not well adapted to the adjustment needs of the low-income farmer. The Farm Improvement Loans Act, for instance, is probably one of the most accessable loans for the low-income farmer; but its total outstanding debt-allowance and down-payment requirements is inadequate in many instances to meet the needs for increased livestock, machinery, buildings and land improvement. Similar conclusions may be drawn for the other loan sources where even more significance is placed on the operator's assets in relation to the size of the loan, because of the lack of a loss guarantee as provided for under the Farm Improvement Loans Act. Since none of the credit agencies within this type of credit provide a management supervision and advisory service, the loans made may bear little relationship to the most profitable purpose. Again, where the farmer is forced to rely on dealer credit or finance companies, he invariably pays a higher rate of interest with even less provision for flexible repayment.

Short repayment terms and security taken on the asset purchased can often be the major limiting factor in using credit insofar as the low-income farmer is concerned. Loans obtained under the Farm Improvement Loans Act for the purchase of machinery, for instance, are restricted to 3 years. Repayment of a loan in this time period becomes very difficult where allowances for family living are already inadequate. Even apart from this, a farmer may find that lack of cash may prevent him from using present credit facilities where security is taken on the asset to be purchased and a substantial down-payment is required. It might also be noted that although the Farm Improvement Loans Act has been a useful

supplement to the area of short and intermediate term credit, over 72 percent of all Saskatchewan loans made under the Act in 1962 were for the purchase of machinery and equipment, with only 10.2 percent of the loans being used for the purchase of livestock.[7/] This suggests that the lack of management counselling may be leading to a less than optimum use of such loans as are available for intensification purposes.

It should be pointed out that intermediate and short-term credit is also available from all three long-term agencies listed in Table 7. The amounts actually disbursed for purchases other than land are typically small, however. In the fiscal year 1961 - 62, for instance, the Farm Credit Corporation advanced 57.8 percent of all its loans for the purchase of land and a further 22 percent to repay land secured debt.[8/] Only 3.2 percent of the total loans were for purchase of livestock and 1.3 percent for the purchase of equipment.

One further general area of credit should not be disregarded. This is the area of private loans - relatives, neighbors, landlords, etc. No data are available as to the general magnitude of loans made available from these sources. A strong possibility exists, however, that the present status of the low-income farmers suggests that few have been able to avail themselves to meaningful amounts of credit from these sources.

1.4 Objective of the Study

A review of the low-income farmer situation suggested the need for

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7/ 18th Annual Report of Operations Under the Farm Improvement Loans Act, Queen's Printer, Ottawa, 1962, P. 9.

8/ Report on the Farm Credit Corporation for the Year Ended March 31, 1962, Queen's Printer and Controller of Stationery, Ottawa, 1962, P. 20.

credit programs designed specifically to assist the low-income farmer in up-grading his net income position. This study was directed to the part that could be played towards this end by the use of supervised intensification credit. Intensification credit was defined for purposes of the study to include all production credit except that for the purchase of land. It was assumed that through provision of supervision, not only would better credit use be assured, but in addition, internal capital rationing would be largely overcome by giving the farmer the confidence needed to borrow large amounts of money.

In establishing the role of intensification credit, three general objectives were attached to the study. They were as follows:

1. The formulation of general principles of intensification credit use.

2. The formulation of an appropriate adjustment program using intensification credit.

3. An evaluation of the potential for a program of intensification credit in meeting the adjustment needs of the low-income farmer.

CHAPTER II

THE THEORY AND USE OF AGRICULTURAL CREDIT

2.1 Credit in the Agricultural Industry

Credit has long been recognized as a potent force in agricultural adjustment. It represents the means by which additional resources can be added to the classical factors of production - land, labor, and capital. By making use of credit, the farmer can increase the economic efficiency of all his resources. Although variously described as a tool of the Devil or a boone to agriculture, there is little doubt that regardless of the esteem with which credit may or may not be held, it is now an integral part of modern agriculture.

Viewed from the standpoint of the agricultural industry as a whole, credit has been looked upon to fill several roles. These diverse roles as played by credit are probably best summed up in the report on agricultural credit submitted to the Government of Saskatchewan by the Royal Commission on Agriculture and Rural Life. They are as follows:[1/]

1. To raise per farm and per worker productivity.

2. To facilitate desirable public goals in the transfer of land and in land tenure arrangements.

3. To facilitate resource development and use:

   (a) clearing and breaking.

   (b) regrassing and erosion control.

   (c) irrigation.

1/ Royal Commission on Agriculture and Rural Life, Report No. 3, Agricultural Credit, Regina, 1955, Pp. 1, 2.

(d) technological changes.

4. To alleviate disaster or emergency situations.

(a) natural hazards.

(b) marketing problems.

In meeting these roles, credit to the agricultural industry can be separated into two main types - credit which facilitates transfer of property within agriculture and credit which provides for new resources to the industry as a whole. Problems exist in both classifications. Where credit required to transfer farms from one generation to another is not readily available, serious problems emerge in the land tenure pattern. Inadequate capital to bring about the transfer seriously handicaps the beginning farmer with a resultant loss in efficiency. In the latter classification, lack of capital necessary to bring new resources into agriculture (capital formation) can mean reduced efficiency in the industry as a whole with subsequent problems at the international trading level. Net capital accumulation in agriculture, it might be added, exists when new investment exceeds depreciation. Normally, this net increase takes place at a time when farm cash income is at a high level with promising future prospects. With decreasing farm cash income, however, the reverse holds true and there is a net capital loss to agriculture. This creates a problem, it is suggested, in that new capital formation during times of low income would serve to increase farm efficiency in a substantial manner.[2/]

2/ I.F. Keith, "Capital Formation in Agriculture", Canadian Journal of Agricultural Economics, Vol. II, 1953, Pp. 19, 20.

Looking still at the broad problem of capital accumulation in agriculture, the proposition has been advanced that poorer agricultural regions, even in good times, may not attain a high enough standard of income to permit new capital expenditures.[3/] The result is that chronic low-income areas develop. These areas are perpetuated through lack of adequate credit required to bring about the needed adjustments in resource use and allocation.

Problems in capital accumulation have been cited, both at the industry and at the farm level. This study is concerned with the problems of capital accumulation on the individual farm; and more precisely, on the low-income farms. What evidence is there to indicate that capital should and can be transferred to such areas? The allocation of credit supplies from the standpoint of over-all national welfare requires that credit be allocated throughout the economy in such a way that its marginal value product in agriculture will equal the marginal value product in other areas of the economy.[4/] Under this concept, the urban and agricultural sectors will be in competition for available supplies of credit. Keith suggested that within the agricultural sector, there is good indication that credit applied to low-income areas may yield higher marginal returns at least within a limited range, than that used in the higher income areas.[5/] This is a result of capital formation occurring most readily in those areas where in relative terms, it is least needed.

3/ Ibid., P. 19.

4/ R.J. Doll, "Developments in Credit for Commercial Agriculture", Journal of Farm Economics, Volume 45, Number 2, May 63, P. 386.

5/ I.F. Keith, Op. Cit., P. 19.

In actual practice, present lending institutions are geared to lend to those farmers possessing a relatively large amount of collateral. To the extent that higher marginal returns may exist on low-income farms because of present limitations on resource use, then there would appear to be valid grounds for making the institutional changes required to facilitate the use of credit on these farms.

Upchurch suggested that beyond a certain size, economies of scale become much less important as a reason for further expansion.[6/] If this holds true, then credit use by the larger farmer will offer a considerably smaller marginal return than that for the small farmer who has yet to take full advantage of the economies of scale. Such a situation would imply the need to make more funds available to the low-income farmer in the interests of the over-all economy.

2.2 Classification of Farm Credit

Credit to agriculture has traditionally been divided into two classes, as based on the purpose of the loan. The first of these classes, consumption credit, is considered to be loans obtained to buy commodities and services used by the farm family. Production credit, on the other hand, is normally thought of as being credit used for ownership of land and for production of farm products. It has been carefully pointed out, however, that the distinction between these two broad classes of credit is considerably short of being precise and clear cut.[7/]

6/ M.L. Upchurch, "Implications of Economies of Scale to National Agricultural Adjustments", Journal of Farm Economics, Vol. XLIII, Dec. 61, Pp. 1242 - 1245.

7/ See W.G. Murray and A.G. Nelson, Agricultural Finance, Ames, Iowa, 1960, P. 43.

Production credit is usually broken into three types according to the time element involved. Diesslin sets out the breakdown as follows.[8/]

Short term - loans for operating expenses and restricted to one year.

Intermediate term - loans for assets having a productive life in excess of one year; i.e., machinery, breeding stock, land improvements, building improvements.

Long term - loans for the purchase of land and buildings (real estate).

Although becoming less important in recent years, classification of production credit by short, intermediate, and long term, is still used by many lending institutions as the basis for establishing collateral requirements and repayment terms of loans for specific purposes.

Loans for agricultural production purposes have also been classed as to purpose of loan, security classification, lender classification, and borrower classification.[9/] For the most part, however, loan classification bears most significance when considering the implications of credit repayment.

2.3 Farm Income in Relation to Repayment of Borrowed Money

Considerable attention is now being given to the influence that alternative types of assets purchased with borrowed funds can have on the amount of indebtedness that can be carried. In this regard, Murray and Nelson suggested that some loans can be termed "self-liquidating".[10/]

8/ H.G. Diesslin, "A Re-examination of the Credit Needs of Agriculture", Journal of Farm Economics, Vol. XXXVI, No. 5, Dec. 54, Pp. 1202 - 1206.

9/ Murray and Nelson, Op. Cit., Pp. 46 - 50.

10/ Murray and Nelson, Op. Cit., Pp. 99 - 100.

They defined a self-liquidating loan as one which promises to repay itself directly from the gross income stream. In this category, they placed loans for operating expenses, suggesting that these are recouped when farm produce is sold. Other examples of at least partially self-liquidating loans were indicated to be loans for machinery, buildings, and breeding stock. The depreciation associated with these items may be used to repay the annual debt. To the extent that the repayment term matches the depreciation life-time of the asset, the loan is considered to be self-liquidating. Where the annual depreciation is actually used to meet debt repayment, a form of perpetual financing is involved since a new loan must be taken to replace the depreciated asset.

In contrast to self-liquidating loans, loans made for resources that do not depreciate or are not used up in the production process, are considered to be non self-liquidating.[11/] Purchase of land would be an example of a loan that is non self-liquidating. Loans that are non self-liquidating must be repaid out of net income, and as such, would compete for family living requirements.

Murray and Nelson suggested that several means are available for strengthening repayment capacity over and above what normally would be supported. These can be summarized in four general groupings.[12/]

1. Build up equity in the business to enable interest on owned investment to be used for debt repayment.

11/ Ibid., Pp. 99-100.

12/ Ibid., P. 102.

2. Use self-liquidating loans as far as possible.

3. Increase net income of the farm business through optimum resource use.

4. Base repayment schedule on anticipated farm income.

5. Place emphasis on enterprises with a fast "turnover" of capital.

2.4 General Considerations Regarding the Use of Credit

The decision to use borrowed capital has been suggested as one of the most important farm management decisions to be made by a farmer. It involves consideration of several factors:[13/]

1. When to borrow.

2. How much to borrow.

3. What to borrow for.

4. Length of loan and repayment schedule.

5. What to use for security.

The foregoing questions must be asked by the farmer. They must also be considered by the lending agency. Although broad principles of credit use have been set forth concerning questions such as these, there remains a considerable diversity of opinion as to the precise recommendations and course of action to be taken.

It is generally conceded that the question of what to borrow for is answered best by marginal analysis. Borrowed funds should be allocated in accordance with the principle of opportunity cost. Profits would be

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13/ E. O. Heady and H. R. Jensen, Farm Management Economics, United States, Prentice Hall, Inc., P. 592.

maximized where the last unit of borrowed capital would bring the same added returns among competing uses.[14/] Even on this point, however, a certain amount of flexibility must be introduced. Heady and Jensen emphasized the point that because of varying risk between enterprises, some farmers might choose a less rewarding, but safer alternative for their borrowed capital.[15/] Murray and Nelson suggested further that in the interest of stretching debt-carrying capacity, there is room to consider self-liquidating loans in preference to loans that will not be self-liquidating, even though a somewhat lower net return might be involved. Further to this question of what to borrow money for, Wadsworth outlined a technique for comparing investment alternatives on the basis of present value returns over and above an assumed normal benchmark, at alternative opportunity rates of return to capital.[16/] Because of the present value calculations required of this method, its use may be somewhat restricted in actual practice.

How much to borrow has probably been somewhat of an academic question to most farmers in that the loan companies themselves have placed limits on what a farmer can borrow with a given amount and quality of collateral. Murray and Nelson pointed out however, that under normal conditions, the amount of money that can profitably be borrowed is determined by the point where marginal returns from the last unit of capital borrowed are equal to the marginal costs associated with the expansion. They also

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14/ Ibid., P. 605.

15/ Ibid., P. 605.

16/ H.A. Wadsworth, "Evaluating Farm Investments by Capital Budgeting", Journal of Farm Economics, Vol. XLIV, No. 5, Dec. 62, Pp. 1444-1446.

indicated, however, that the available repayment capacity of the borrower may limit the use of credit despite opportunities of additional profits with the use of more capital. This limitation would take place particularly where loans are advanced for purposes that are not self-liquidating.[17/] Heady and Jensen reiterated that although the marginal cost - marginal re-returns principle indicates how much capital can profitably be used, the principle of increasing risk helps determine how much money can be safely borrowed.[18/] This principle suggests that as a farm business expands through use of borrowed capital, the chance of a farmer losing his own capital increases.

Length of loan and repayment schedule is a critical element in determining the success of a loan. Repayment terms that are too short require stiff and sometimes impossible sacrifices on family living standards. Where loan repayment dates do not coincide with farm receipts, loan defaults are again a danger. In many instances, credit agencies determine the term of loan by the anticipated life of the asset for which it is used. Thus the concept of short, intermediate, and long term credit. Where such practices exist, loans are often granted in "parcels", with each parcel having a term appropriate to the expected life of the item for which it was used. Morrow, in discussing loans made by production credit associations in the United States, pointed out that annual loans would be made for livestock purchases and operating expenses.[19/] Separate loans would be given for machinery and equipment for a period of three years. A third

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17/ Murray and Nelson, Op. Cit., P. 100.

18/ Heady and Jensen, Op. Cit., P. 605.

19/ S.A. Morrow, "Intermediate-Term Credit in Agriculture", Journal of Farm Economics and Canadian Journal of Agricultural Economics, Vol. XL, Dec. 58, Pp. 1136 - 1137.

loan for a somewhat longer term could be advanced for such items as soil improvement, irrigation or major building purchases. In advancing loans such as the foregoing, the repayment plans provide for annual payments commensurate with the depreciation of the collateral and the ability to pay.

An important point that has been made in connection with the length of loan and repayment schedule, is the need for budgeted loans. This method helps assure that loan payments will be forthcoming from the farm business at the right time. A budget of this nature will supplement the budgeting done to determine the best use of credit, in that it will add details as to the systematic manner in which credit will be needed, and how funds are to be obtained for the repayment of this credit.

Much greater consideration is now being given to the proposition that loans should not be made on behalf of, or secured by specific goods and commodities. This new concept of borrowing involves a "package loan" with no consideration given as to whether it is to be short, intermediate or long term credit. The package credit, it is argued, should be tied to the entire farming operation by financing the farm as a complete unit. In discussing this type of credit, Diesslin outlined certain rules which he felt should be followed.[20/]

1. The amount loaned should probably not exceed the amount to be required during the first several years of the improvement program.

20/ Diesslin, Op. Cit., P. 1211.

2. The loan should be amortized over a fairly long period to ensure low annual payments.

3. Flexible repayment programs should be provided for with advance or delayed annual payments and a complete repayment option without penalty after a few years.

4. Short term credit should be provided to take care of seasonal fluctuations in credit needs and to allow for incidental improvement programs.

Collateral requirements for agricultural loans determine to a large extent, how credit will be allocated among agricultural producers. Where equity requirements are high, the low-income farmer finds himself at a distinct disadvantage when competing with the more highly capitalized farmers for credit and the subsequent uses of this credit. On the other hand, with very low equity requirements, the lender assumes a proportionately higher risk in making the loan. In order to offset the need for a fairly substantial equity within the farm business, two separate courses of action have been proposed:[21/]

1. Introduce farm planning as a partial substitute for loan collateral.

2. Introduce greater flexibility in loan repayment.

Brinser and Wheeler suggested that upon finding accurate ways of measuring earning capacity, and with provision for postponing payments in emergencies and prepaying under favorable conditions, a suitable farm plan "substitutes for the illusory security of foreclosure, the real security of an increased

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21/ A. Brinser and R.G. Wheeler, "Farm Planning as a Basis for Extending Agricultural Credit", Journal of Farm Economics, Vol. XXX, No. 2, May 48, Pp. 243-245.

earning capacity."[22/] Brinser and Wheeler also suggested that when farm plans require a chain of adjustment over time, provision should be made for the lender to provide specific advances as the plan progresses. Making all the money available at the beginning of the plan would increase obligations without subsequent benefit. A similar proposal along the lines of a "revolving" series of loans has been advanced by Diesslin.[23/] He suggested that a series of renewable annual loans might be very useful in allowing a farmer to develop his farm operations as needed and yet with flexibility of loan repayment. He cited several advantages and disadvantages for this type of loan:

Advantages:

1. Advances and their repayment can be made highly flexible.
2. Larger loans relative to the operator's collateral can be made than with conventional long term commitments.
3. There is considerable scope for revising or changing plans quickly.

Disadvantages:

1. There could be uncertainty as to renewal of the loan.
2. There will probably be a higher cost of funds.
3. Credit rationing could be possible due to rigid renewal policies or regulations.

In summing up regarding the proposed annual loans, Diesslin advanced the proposition that a loan of this type could be of strong advantage to both the borrower and the lender. The advantage would be gained through

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22/ Ibid., P. 258.

23/ H. G. Diesslin, Op. Cit., P. 1205.

having an annual appraisal of the loan and the year's results, which would enable changes to be made in the future plans, should the need exist.[24/]

2.5 Credit and the Low-Income Farmer

The position of credit as a method of assisting the low-income farmer is not clear-cut. Diesslin, in his paper "A Re-Examination of the Credit Needs of Agriculture" chose to exclude the credit aspect of the low-income farm problem, feeling that this analysis was based more on welfare than production efficiency. He voiced the opinion that grants and subsidies would be required for rapid progress, as would substantial supervision. Under these conditions, he felt that little commercial credit would be forthcoming.[25/]

A similar view is expressed by Morrow. He observed that just providing intermediate term loans will not save all farmers in that many are unsound and cannot be saved by simply granting longer maturities on capital items.[26/] The discussant for Morrow's paper, N.A. Jamba, provided further weight to this viewpoint as he added two additional points:[27/]

1. The inability of a certain class of farmers to compete on profitable terms with the rest of the industry shouldn't be construed as the need for either more liberal repayment terms or a specific type of credit.

2. With increasing complexity on modern farms, the need becomes that of better farm management, rather than a greater availability of credit.

24/ Ibid., P. 1205.

25/ Ibid., P. 1202.

26/ S.A. Morrow, Op. Cit., P. 1134.

27/ N.A. Jamba, "Discussion: Intermediate-Term Credit in Agriculture", Journal of Farm Economics and Canadian Journal of Agricultural Economics, Vol. XL, Dec. 58, P. 1143.

Schickele, in his book "Agricultural Policy" took a somewhat more temperate view of the low-income farm problem.[28/] To Schickele, the criteria as to whether or not assistance should be provided to low income farms is whether or not these families would contribute more to the social product on the farm, than if they shifted. He pointed out that increased efficiency on these farms can be brought about either by adding acreage (horizontal expansion) or by increasing production within the present unit (vertical expansion). Schickele indicated that much can be done to improve resource allocation within the industry through the use of a credit program such as that offered by the Farmers Home Administration. He cited three features of the F. H. A. Loans that commend themselves to the end of better resource allocation:

1. Loans are extended on the basis of managerial needs rather than collateral security.

2. Intermediate term loans for multiple purposes are extended along with flexible repayment schedules.

3. Loans are supplemented with technical advice and farm and home planning service.

Schickele suggested also that various methods of mortgage insurance, or government guarantees of interest and principal may enable private lenders to expand supplies of farm production credit. Governments, he pointed out, would be justified in bearing some of these costs as a profitable policy to improve resource allocation and production efficiency,

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28/ R. Schickele, Agricultural Policy, McGraw-Hill Book Co. Ltd., United States, 1954, Pp. 90, 91.

especially where the practical alternatives might be relief grants.

J.D. Black put forth views similar to Schickele in his paper "The Low-Income Farmer Problem".[29/] He advanced the opinion that moving low-income farmers to urban centers should be done only if they actually improve their status. In his opinion, two adjustments are needed for those low-income farmers still left in an area:

1. Provision of credit for purchase of land, land improvement, purchase of livestock and equipment, and the making over or enlarging of farm buildings.

2. Provision of assistance for the low-income farmers in planning new adjustments. In this connection, he suggested that extension resources might well be diverted from farmers who are already producing a surplus, to those farmers who are trying to get on their feet.

The "low-income" farm nomenclature encompasses a wide variety of farms. It includes the young beginning farmer and the older farmer, due shortly for retirement or now in the process of retirement. Much of the literature on the low-income farmer problem recognizes this variation in age groups when suggesting programs for farm education and programs for resettlement to urban areas. To a large extent, the somewhat contradictory views expressed with regard to credit and the low-income farmer are based primarily on the age group considered by the author. Whereas credit assistance to older farmers is often considered in the context of social welfare aid,

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29/ J.D. Black, "The Low-Income Farmer Problem," Canadian Journal of Agricultural Economics, Vol. VI, No. 1, 1958, Pp. 32, 33.

it is also recognized that most beginning farmers are low-income farmers by necessity. With the present land policies leaning heavily to widespread individual ownership for land, there is generally conceded a need to help young farmers get started in farming. Bradford noted that even though there may still be too many farmers, it will be sound policy to assist those best qualified and interested to gain entrance to farming, but only to the extent that the size of business will earn a good living.[30/] Bradford also indicated that capital limitations may have their place in helping to balance the numbers needed for the national good. This is no reason, however, he pointed out, for allowing some entrants to fail because of some short-run problem over which they have no control.

2.6 Present Programs of Supervised Credit

Supervised credit on a large scale received its first impetus in Saskatchewan through the lending activities of the Veteran's Land Act. Organized to provide financial assistance on behalf of veterans of World War II and the Korean Special Force, the Act now makes loans available for either full-time farming or part-time farming. Under Part I of the Act, assistance up to $6,000 is provided for veterans to settle as part-time or full-time farmers.[31/] This money may be used for the purchase of land, buildings, building materials, and up to $1,200 for livestock and equipment. The veteran must make an initial deposit of 10% of the amount to be used for the purchase of land and buildings. He then contracts to

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30/ L.A. Bradford, "Critical Problems of Young Families in Getting Established in Farming", Journal of Farm Economics, Vol. XXXVI, No. 5, Dec. 54, Pp. 1011.

31/ Annual Report, Department of Veteran's Affairs, 1962-63, The Queen's Printer, Ottawa, 1963, Pp. 39, 40.

repay two-thirds of the amount paid for land and buildings over a maximum period of 30 years at 3½% interest. The remaining 23-1/3%, plus the amount expended for the purchase of livestock and equipment, constitutes a conditional grant which is nonrepayable if the veteran fulfills the terms of his contract for a period of 10 years. The part-time farmer established under Part I may also obtain an additional Part III loan of $6,000 or 75% of the current market value of the farm, whichever is the lesser. This additional loan is not available for the purchase of farm machinery. The interest rate on the additional loan is 5 percent.

A Part III loan under the Act can be made to a veteran farming full-time, for the purpose of developing an economic unit. A qualified borrower can receive up to $20,000 less any amount outstanding under the Part I contract, or 75% of the security value of the land, basic herd livestock and farm equipment - whichever is the lesser. Loans under Part III are fully repayable and bear interest at 5 percent for a period not exceeding 30 years.

To a large extent, the relative success of the V. L. A. supervised credit program has been as a result of the close liason between the borrower and the credit advisor representing the Veteran's Land Act. The credit advisor acting as an agent of the Veteran's Land Act, has three main job functions.[32/] His first function is to undertake preloan counselling for the purpose of determining the experience and managerial ability of the applicant, the soundness of the applicant's plans for farm operation,

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32/ Annual Report, Department of Veteran's Affairs, 1958 - 59, The Queen's Printer, Ottawa, 1959, Pp. 36, 37.

and the suitability of the enterprise in relation to the applicant's experience and farm. It is suggested that this preloan counselling service provides a valuable service in determining that sound loans are made, based on firm and carefully considered farm plans. The second function performed by the credit advisor follows more along the lines of conventional lending - that of appraising property to be purchased or offered as security. The third, and probably most important function of the credit advisor is to provide management and technical assistance to the loan applicant until such time as he is firmly established on an economic unit.

It is the supervisory aspect of the credit advisor's role that originally set the Veteran's Land Act apart from other credit sources. Not only does the farmer stand to gain through this assistance, but the repayment of the loan itself is placed on firmer grounds. Although typically difficult to measure, some indication of the success of this approach can be obtained by reference to the record of loan repayments. As indicated in the 1963 Annual Report, 99.3 percent of installment loans falling due from inception had been paid as of March 31st. At the end of the 1963 fiscal year (March 31), the number of full-time and part-time farmers with arrears of $200 to $100 respectively represented less than 2.5 percent of the active repayable accounts.

In an effort to assess the progress and future credit requirements of the full-time farming veterans settled under the Act, the Veteran's Land Act completed a survey of some 6,000 settlers.[33/] The results of

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33/ Ibid., Pp. 36, 37.

this survey indicated substantial progress on behalf of the respondents. The average net worth of the settlers, for instance, increased from $5,376 at the time of settlement to $13,487 some 8.9 years later.

During the course of each survey, the farmer was assisted in replanning his unit to assess the requirements for extra credit needed to obtain the size of unit required for an average standard of living. The settlers reported a net income (including perquisites) of $3,207 at the time of the survey in contrast to an average desired net income of $4,309. A reorganization of the farm, on the average, was estimated to be capable of giving a net income of $5,186 or a level 62 percent greater than that enjoyed at the time of the survey. The settlers estimated that an average of $9,740 would be needed for this reorganization. This included $2,219 of V. L. A. contract debt still owing, plus $857 credit presently extended from other sources. Additional credit of $6,664 was considered necessary. Against this extra credit, there was estimated to be $23,227 available for security after the added loan had been expended.

Analysis of the records indicated that reorganization of the units would require several alternative courses of action. These changes were as follows:

1,441 farmers - best suited to continue as at present.

808 farmers - continue with same land but change enterprises.

1,359 farmers - enlarge farm but continue same enterprise.

618 farmers - enlarge farm but change enterprise.

104 farmers - sell present farm and buy better one.

508 farmers - should continue holding only as part-time enterprise and continue off-farm work as main occupation.

162 farmers - should sell their farm and seek employment away from the farm.

Supervision of farm credit use has in recent years, become part of a more general lending program through the facilities of the Farm Credit Corporation. Working along lines established under the Veteran's Land Act program, the Farm Credit Corporation now makes supervision a requirement of its Part III borrowers.[34/] Supervision is also available to Part II borrowers upon request. A supervision charge of $25 per year is charged to all borrowers having the use of this service. It should be noted, however, that credit extended by the Farm Credit Corporation must result in an economic farm unit in order for an applicant to qualify for a loan. No loan is made unless the applicant can acquire what is judged to be an economic unit through use of the credit. The net result of this regulation is that many beginning and low-income farmers may be denied credit because their available security is inadequate to obtain the size of loan needed to establish an economic unit. The Veteran's Land Act provisions overcome this problem to some extent, by making loans to part-time farmers who may some day be able to take on extra credit to establish economic farm units.

Because of the emphasis on high operator equity and because of the desire to have all loans result in an economic unit, there is relatively little financial assistance forthcoming to the low-income farmer under present credit institutions such as the Farm Credit Corporation or the

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34/ Annual Report, Farm Credit Corporation, 1963-1964, The Queen's Printer, Ottawa, P. 8.

Veteran's Land Act. This suggests the need for a lending institution which might act as a lender of last resort. The purpose of such an institution would be to provide credit to deserving low-income farmers with the objective that they may be able to consolidate their resource base and experience for later "graduation" to conventional credit sources. Although a credit agency of this nature is not available to Saskatchewan farmers, it does exist in the United States in the form of the Farmers Home Administration. The features of this program have special relevance to the adjustment needs of the low-income farmer.

The Farmers Home Administration, an agency of the United States Department of Agriculture, was created as a result of the Farmers Home Administration Act of 1946.[35/] This Act abolished some of the earlier rural credit agencies and brought most of the direct Federal lending programs for rural people under the authority of the F. H. A. The National Office of the F. H. A. is located in Washington, D.C., with some 1,450 county offices located throughout the United States.

Two primary functions are cited for the F. H. A. as it exists today. The first and major function is to provide supervised agricultural credit to farmers who are unable to borrow from conventional sources, the credit at terms needed to make their farming operations successful. As a part of this major function, the F. H. A. also provides credit under supervision for the low-income farmer who is attempting to bring his income up to a

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35/ See Murray and Nelson, Op. Cit., Pp. 440-449.

more reasonable level. Under the second primary function of the F. H. A., emergency credit is made available for farmers who are temporarily in financial difficulty because of emergency conditions beyond their control, and who cannot obtain conventional credit during this time. In more recent times, a third function of the F. H. A. has been to provide the field level approach for the promotion and organization of the rural development work undertaken by government through the Rural Areas Development (RAD) programs.

The F. H. A. administers supervised credit to needy and deserving farmers under the thesis that economically healthy rural communities based on family farms, are an essential part of a healthy over-all economy. To ensure that this objective is met, the F. H. A. works through local committees who check out the eligibility and ability of the applicants and the purpose of the loans. Specially qualified and trained F. H. A. staff members look after the appraisal of the farm and chattels, the investment of funds, the organization of the farm and subsequent use of income. General program policy is based on the assumption that many farmers not eligible for conventional credit, can become successful farmers if given such advice and supervision as may be needed to reorganize their farm, along with sufficient capital to make the necessary adjustments.

Six main programs are carried on by the F. H. A. These include the provision of credit to provide for (1) farm operating loans, (2) farm ownership loans, (3) emergency loans, (4) rural housing loans, (5) water development loans, and (6) watershed loans. Funds to carry out these programs come from three main sources. The first source is money borrowed from the Federal Treasury each year under authorization of Congress. To this money is added a revolving fund set up by Congress for the primary

purpose of coping with emergency loans. The final source of money available for F. H. A. operation are funds furnished by banks and other lenders for loans insured and serviced by F. H. A. Loans made from funds borrowed from the Federal Treasury are termed direct loans. These loans are repayable directly to the Federal Treasury. Loans made with funds obtained from other lenders are classified as insured loans. The F. H. A. handles collections and supervision of the insured loans in return for a portion of the repayment held back from the lender for administrative and insurance charges.

Considerable effort is made by the F.H.A. in ensuring that loans are made only to farmers who are unable to obtain adequate credit under reasonable terms from other sources. This policy is to ensure that activities under F. H. A. supplement conventional credit, rather than compete directly with it. All borrowers under F. H. A. agree to obtain their credit from other lenders when they reach a position that allows them to do so. They also agree to refinance the balance of their loan as soon as they can obtain adequate credit on reasonable terms.

Two programs of the F. H. A. lending program are of special interest to this study. These two programs, farm operating loans and farm ownership loans, are outlined in more detail as follows:

1. Farm Operating Loans:

The essential purpose of the operating loan is to enable farmers to obtain chattel resources essential to successful farm operation. Operating loans can be used for a wide variety of productive purposes but cannot be used to purchase real estate, nor can more than $2,500 be used for improvements to real estate in any one year. The actual amount that can be

borrowed is limited to the borrower's needs and repayment ability, but in any event, cannot exceed $35,000 at any one time. The current interest rate is 5 percent.[36/]

Repayment of borrowed funds under the farm operating loan program is normally on an annual basis in accordance with the operator's ability to repay. All loans are originally scheduled for not more than seven years and may be renewed for periods up to five years. Loans for operating expenses during a crop year are generally repaid upon receipt of the year's income. Other loans such as for livestock and equipment, may be extended to the full limit of seven years.

Security for operating loans is usually taken by chattel mortgages on equipment, livestock, crops and other chattels. Security on real estate is taken only when it is necessary to make a second F. H. A. loan and when other security is poor. Where loans are made for improvement to real estate, up to $1,500 can be obtained on the security of the borrower's promissory note.

2. Farm Ownership Loans:

Farm ownership loans can be used for four major purposes. Loans are advanced for the purpose of (1) buying a family farm or additional land to enable the present farm to reach a more adequate size, (2) to make major improvements to land and buildings, (3) to refinance existing debts and (4) to allow for provision or improvement of water supplies and facilities.

36/ H.D. Carr, Farm Credit in the United States, Farm Credit Corporation, Ottawa, 1964, Pp. 31-33.

Farm ownership loans are limited to a maximum of $60,000 total indebtedness (including the F. H. A. loan) allowed against the security. Security is taken by a first or second mortgage on the owner's equity. Loan payments are due January 1 each year and interest at 5 percent is charged on the unpaid balance. Borrowers are given encouragement to build up a reserve fund in years of good income to keep the loan in good standing during years of low-income. This plan involving a reserve fund has replaced an earlier variable repayment program. The variable repayment program provided for payments to be based on net income available after deduction of necessary living expenses. This plan was discontinued mainly because it was hard to administer and a satisfactory way could not be found to determine payment levels.

Loans for farm ownership can be made with funds supplied directly by the government or private investors. The F. H. A. handles all the administration of a loan for a private investor in return for a charge of up to 1 percent for services. Where default is involved, the F. H. A. pays the private lender the full amount outstanding. Insured loans through private lenders cannot exceed 90 percent of the "normal" value of the real estate given for security. Direct loans, on the other hand, can be made for the full "normal" value of the security. "Normal" value during 1963 as determined by F. H. A. appraisals averaged out to about 70 percent of the current market value of the properties involved.[37/] A maximum term of 40 years is allowed on farm ownership loans.

37/ Ibid., P. 35.

Both operating loans and farm ownership loans are classified into "adequate family farming operations" and "other family farming operations". This distinction is used to make provision for the fact that with some loans (other family farming operations), the objective is to provide assistance to the farmer in expanding his income, recognizing that it may not result in a completely self-sufficient farm unit. Loan applicants receiving loans of this nature receive income from other sources, but must be considered to be "farmers" within the community. Loans made to provide for "adequate family farming operations" must result in a unit that will provide a reasonable standard of living for the operator and his family after expenses and debt repayment have been met.

In order that risk is reduced and to help borrowers become established on a sound basis as soon as possible, both the operating and farm ownership loans are backed with technical advice and management assistance. Normally the county supervisor provides this assistance through a series of several steps.

As a first step in assisting the farmer, the county supervisor helps the borrower and his wife to develop a long-term plan outlining the major farm development to be taken over the years. This is then supplemented by annual Farm and Home Plans designed to guide the year's operations and to facilitate progress toward the long-term plan.

A second step in the supervision program involves several visits to the farm during the year to provide technical advice in carrying out the goals of the annual and long-term plans. This is then followed by assistance to the family in setting up and keeping a good system of record keeping for evaluating management practices and financial progress. At

the end of the year, the county supervisor helps the family in using the records to analyze the farm business for the year. On the basis of this analysis, the county supervisor then completes the annual program of assistance by aiding the family to set up a new annual plan of operation. Less intensive supervision is given in future years as the borrower becomes better established. In some instances, only limited supervision is given initially where capable managers are involved.

Repayment experience for both the operating and farm ownership loans has been favorable.[38/] With the operating loans, for instance, less than 1 percent had been charged off at the end of 1960 and principal payments amounted to 95 percent of matured principal. Write-offs for the farm ownership loans were less than ½ of 1 percent at the end of 1960.

38/ Ibid., Pp. 33, 35.

CHAPTER III

SYNTHESIS OF A PROGRAM OF SUPERVISED INTENSIFICATION CREDIT

3.1 Thesis Objectives

A basic assumption behind this study was that a select program of intensification credit could do much to alleviate the low-income farmer situation. With this assumption in mind, three major objectives were established:

1. The formulation and testing of principles governing the sound use of intensification credit. This was considered to involve a study of the relationship between net farm income and family living standards with regard to:

   (a) Term of loan.

   (b) Interest rates.

   (c) Size of loan in relation to operator's equity.

   (d) Purpose of loan.

2. The formulation of a hypothetical credit program using supervised intensification credit:

   (a) Amount of loan available and its purposes.

   (b) The appropriate term of loan and interest rate.

   (c) Security required of borrowers.

   (d) Repayment provisions.

3. The determination of the potential for assisting low-income farmers by means of an appropriate program of supervised intensification credit:

   (a) The relative increase in family living standards and net

farm income possible through provision of intensification credit.

(b) The degree by which provision of intensification credit might allow a low-income farmer to accumulate the equity base needed to "graduate" to conventional credit sources.

3.2 Interrelationships of Credit Use as a Basis for Formulating Principles Governing the Use of Intensification Credit

A critical factor in establishing the appropriate use of a loan and its most favorable repayment terms, is the way in which the money for repayment is generated in the farm business. Also involved is the question of whether the loan is to be used to maximize family living standards in the short run or net farm income in the long run. These considerations are reviewed in the following sections:

3.2.1 The Effect of Credit Repayment on Family Living Standards

A common measure of farm returns is net farm income.[1/] This represents the return to a farmer for his labor and investment. Cash operating costs and depreciation have been deducted from gross income in arriving at net farm income. Where a farm is owned outright and no borrowed funds are employed, the net farm income figure represents the sum of money available to the farmer to provide for family living and for future expansion. Since operating expenses and depreciation have been deducted from gross income at this stage, the business can remain operational in the long run at its present level of resource use (assuming, of course, that a sufficient level of income is available). If borrowed money is used in the farm business, however, repayment of principal and interest charges must come

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1/ Net farm income is defined for the purpose of this study as return to total capital and to operator and family labor.

out of the net farm income returns. The size of the debt and its repayment term will determine how much of the net farm income figure must be used each year for debt repayment. The residual income remaining after debt repayment becomes the allowance available for family living for the duration of the loan.

Two levels of family living standards can be identified, depending on whether a long-term or a short-term adjustment period is considered. The residual available for family living in the long run has already been spelled out. It is the operator's return to labor and investment after depreciation and cash operating expenses have been deducted from gross income. Where borrowed money is involved, the annual amortized payment must be deducted to give the family living standard during the repayment period. The family living standard is considered to be a long-term income level since adjustment has been made for annual cash expenses and for replacement of buildings, machinery, and other depreciable assets. A short-term adjustment period can also be considered. Where a limited time period is involved, a farmer may elect to increase his living standard by "living off his depreciation." In effect, instead of setting aside an allowance for depreciation each year, the farmer can use this reserve to augment his supply of income for family living and debt repayment. This can only be a short-term adjustment, however, in that the machinery and buildings must eventually be replaced if the farmer is to continue in business. The important aspect of this short-term adjustment, however, is that increased debt repayment capacity can be obtained over a fairly short period of time without further sacrifices in the family living standards.

3.2.2 Alternative Credit Use in Relation to Family Living Standards

It has been suggested that loans can be separated into three main categories in terms of the effect on the family living standard as they are repaid:

1. Loans for depreciable capital assets.
2. Loans for non-depreciable capital assets.
3. Loans for annual operating inputs.

Where a short-term adjustment period is considered, loans made for depreciable capital assets can be considered partially self-liquidating, to the extent that such loans result in a use which will justify the expenditures involved. This suggests that annual depreciation on depreciable assets such as buildings and improvements, machinery and equipment, and basic breeding stock can be used to help repay the loan. If the term of the loan for a depreciable asset is equal to the normal depreciation life-time of the asset, the principal portion of the loan repayment can be entirely met through deferment of annual depreciation reserves. Family living standards would not be lowered during the repayment period of such a loan. To the extent that the loan is for a shorter period of time than the depreciation life-time of the asset, the difference between the annual depreciation loss and the required average principal repayment represents net capital accumulation which must be deducted from net farm income. The family living standard must be reduced by the amount of annual net capital accumulation involved, until such time as the loan is repaid.

Non-depreciable capital assets refer to those items which do not depreciate in the accounting sense of the word. Included in this category

are loans for the purchase of land, for clearing and breaking, and for other permanent land improvements. Where money is loaned for any of these purposes, the entire repayment represents capital accumulation and must therefore come out of net farm income. In effect, the farmer must accumulate the value of the asset within the time period of the loan. There can thus be no short-term adjustment period in which repayment of the loan is assisted through deferment of depreciation reserves. Available family living standards will be lower by the average principal payments during each year that the loan is repaid.

Loans for annual operating inputs include all items of production that are used up within the year. By nature of their definition, since loans for operating inputs are entirely used up within the year, they can therefore be repaid within the year. No capital accumulation is necessarily involved since these items are returned each year in the gross income of the farm.

With reference to the short-term adjustment period, it was suggested that family living standards need not be reduced by loan repayments, to the extent that the loan is directed to depreciable assets, and where the term of the loan approximates the depreciation life-time of the asset. This is strictly a short-term adjustment, however, in that repayment of the loan through depreciation reserves involves a form of perpetual financing. If depreciation reserves are used to pay back the loan, then a new loan must be taken out to replace the depreciable assets. A similar situation exists in the repayment of money borrowed for operating inputs. Inasmuch as these items are returned in the gross income stream, they may be considered to be self-liquidating with regard to a

one year adjustment period. If the farming business is to continue in the ensuing year, however, than a new loan must be obtained to refinance the next year's operating inputs.

When the long-term adjustment time period is considered, the farmer is assumed to set aside the necessary depreciation reserves and operating inputs to permit farm operations over an indefinite time period. Where borrowed money is involved, the family living standard from the viewpoint of the long-term adjustment may be entirely different from what might be enjoyed over the short-term adjustment period. The difference is this; if the farm is to be self-sufficient at the conclusion of the loan period, then there must be sufficient net capital accumulation during the term of the loan to provide for principal repayment without having to draw on annual depreciation reserves and operating inputs. This suggests that depreciation reserves and annual operating inputs returned each year in the gross income stream cannot be used for debt repayment unless additional credit use is assumed in the future. Repayment of debts for all purposes (depreciable assets, non-depreciable assets and operating inputs) must come out of net farm income in the form of capital accumulation. The longer the repayment term, the smaller will be the annual capital accumulation required; and consequently, the smaller the pressure on family living standards.

3.3 Mathematical Relationships in the Use of Credit

In an effort to formulate principles governing the use of intensification credit, consideration was given to mathematical relationships existing between the key determinants involved in the use of credit. A review of literature on the subject of credit repayment indicated that

the level of family living standard remaining after debt repayment varies with the operator's equity and the size of the loan, the repayment term, the interest costs associated with the loan, and the income possibilities offered by use of the loan. The absolute level of family living standards during the repayment period of the loan was also suggested to be dependent in certain instances on whether the loan is used for depreciable assets, non-depreciable assets, or operating inputs.

Since one of the major concerns of this study was to formulate a lending program to improve the level of family living standards, an attempt was made to express this item as a function of the several related variables indicated in the previous paragraph. It was reasoned that if the income earning potential of a farm could be expressed as a return to total labor and investment (net farm income as a percent of total capital), then an equation could be formulated to give family living standards available under alternative levels of operator equity, credit used, rate of interest, and term of loan. This equation was established as follows for the long-run adjustment period:

Where,

A = Family living standard after loan repayment (principal and interest).

R = Return to labor and investment (net farm income as percent of total capital).

E = Operator's equity in the farm business.

C = Amount of credit used.

i = Rate of interest on borrowed money, and

n = Term of loan in years, then

$$A = (E + C)R - C\left[\frac{i}{1 - \left\{\frac{1}{(1 + i)}\right\}^{n}}\right]$$

This basic equation was then used to establish general relationships between the size of the operator's equity and:

1. The term of the loan.
2. The size of the loan, given its term.
3. A given level of loan, at alternative rates of interest on borrowed capital.
4. A given level of loan, at alternative rates of return to labor and investment (R) earned on total capital.
5. A given level of loan, at alternative minimum family living standards.

Hypothetical data was used for loan limits, term of loan, interest rates on borrowed capital, labor and investment return to total capital, and minimum family living standards. Results for each relationship were as follows:

1. The relationship between operator's equity and the term of the loan.

Where,

A = $1,800

R = .12

i = .05

n = 10 years and 20 years

C = $20,000

and where the basic equation was expressed in terms of operator's equity, then

$$E = \frac{A + C\left[\dfrac{i}{1 - \left(\dfrac{1}{1+i}\right)^{n}}\right] - RC}{R}$$

Where n = 10 years,

$$E = \frac{1800 + 20{,}000\ (.1295) - .12\ (20{,}000)}{.12} = \$16{,}583$$

Where n = 20 years,

$$E = \frac{1800 + 20{,}000\ (.08024) - .12\ (20{,}000)}{.12} = \$8{,}373$$

As indicated, where the term of the loan increased from 10 to 20 years, the required operator's equity was found to reduce from 45.3 percent of total capital to 29.5 percent.

2. The relationship between operator's equity and the <u>size</u> of the loan, given the <u>term:</u>

Where,

A = $1800

R = .12

i = .05

n = 20 years

E = $5,000 and $10,000

and where the basic equation was expressed in terms of the amount of credit use, then

$$C = \frac{A - RE}{R - \left[\dfrac{i}{1 + \left(\dfrac{1}{1+i}\right)^{n}}\right]}$$

Where E = \$5,000,

$$C = \frac{1800 - .12\ (5{,}000)}{.12 - .08024} = \$30{,}180$$

Where E = \$10,000,

$$C = \frac{1800 - .12\ (10{,}000)}{.12 - .08024} = \$15{,}090$$

Increasing the operator's equity from \$5,000 to \$10,000 indicated a decrease of fifty percent in the amount of credit required in order to enable a minimum family living standard of \$1,800 after repayment of debt (principal and interest). When the term of the loan was assumed to be 10 years instead of 20 years, a different situation was found to exist: Where E = \$5,000 and n = 10 years,

$$C = \frac{1800 - 12\ (5{,}000)}{.12 - .1295} = \frac{1200}{-.0095} = -\$126{,}316$$

Where E = \$10,000 and n = 10 years,

$$C = \frac{1800 - .12\ (10{,}000}{.12 - .1295} = \frac{600}{-.0095} = -\$63{,}158$$

A ten year repayment term indicated that no loans could be made under the assumptions given at either operator equity levels of \$5,000 or \$10,000, if a minimum family living standard was to be maintained during the repayment period. This situation existed because the rate of return assumed for labor and capital (.12) was <u>less</u> than the annual principal and interest repayment (.1295) required per dollar borrowed for the 10 year loan period. Where the operator's equity was sufficient in itself to provide the minimum family living standard of \$1,800, borrowing was found to be possible <u>to the extent</u> that returns generated by the operator's equity could offset the difference between the return to

borrowed capital (.12) and the annual amortized payment per dollar (.1295). This was illustrated as follows:

Where E = \$20,000 and n = 10 years,

$$C = \frac{1800 - 12\ (20{,}000)}{.12 - .1295} = \$63{,}158$$

3. The relationship between the operator's equity and a given level of loan at alternative interest charges on borrowed capital:

Where,

A = \$1,800

R = .12

i = .03 and .06

n = 20 years

C = \$20,000

and where the basic equation was expressed in terms of operator's equity, then,

$$E = \frac{A + C\left[\dfrac{i}{1 - \left(\dfrac{1}{1+i}\right)^{n}}\right] - RC}{R}$$

Where i = .03,

$$E = \frac{1800 + 20{,}000\ (.06722 - .12\ (20{,}000)}{.12} = \$6{,}200$$

Where i = .06,

$$E = \frac{1800 + 20{,}000\ (.08718) - .12\ (20{,}000)}{.12} = \$9{,}533$$

Increasing the interest rate from 3 percent to 6 percent was found to result in a boost in required operator equity from 23.7 percent to 32.3 percent of total capital.

4. The relationship between operator's equity and a given level of loan at alternative rates of return to labor and investment (R).

Where,

A = $1,800

R = .12 and .15

i = .05

n = 20 years

C = $20,000

and where the basic equation was expressed in terms of the operator's equity, then

$$E = \frac{A + C\left[\frac{i}{1 - \left(\frac{1}{1+i}\right)^{n}}\right] - RC}{R}$$

Where R = .12,

$$E = \frac{1800 + 20,000\ (.08024) - .12\ (20,000)}{.12} = \$8,375$$

Where R = .15,

$$E = \frac{1800 + 20,000\ (.08024) - .15\ (20,000)}{.15} = \$2,700$$

Increasing the rate of return to labor and investment from .12 to .15 indicated a decrease in the required operator's equity from 29.5 percent to 11.9 percent of total capital.

5. The relationship between the operator's equity and a given level of loan at alternative minimum family living standards:

Where,

A = $1,800 and $2,400

R = .12

i = .05

n = 20 years

C = $20,000

and where the basic equation was expressed in terms of operator's equity, then

$$E = \frac{A + C\left[\dfrac{i}{1 - \left(\dfrac{1}{1+i}\right)^{n}}\right] - RC}{R}$$

Where A = \$1800,

$$E = \frac{1800 + 20{,}000\ (.08024) - .12\ (20{,}000)}{.12} = \$8{,}375$$

Where A = \$2400,

$$E = \frac{2400 + 20{,}000\ (.08024) - .12\ (20{,}000)}{.12} = \$13{,}375$$

The required level of operator's equity was found to increase from 29.5 percent of total capital at \$1800 minimum family living standard to 40.0 percent of total capital at \$2400 family living standard.

3.4 Summary of Generalizations Regarding Credit Use

A review of literature on the subject of credit use, supplemented by the use of the foregoing mathematical models, enabled a number of broad assumptions to be reached concerning the key relationships underlying the use of credit. These assumptions were separated into both a short-term and a long-term adjustment period on the basis of the effect on family living standards. Family living standard in terms of the long-term adjustment period, was considered to be net farm income <u>less</u> repayment of principal and interest on borrowed money. The short-term adjustment period was considered to give a family living standard equal to net farm income <u>plus</u> annual depreciation reserves, <u>less</u> repayment

of principal and interest on borrowed money. The basic distinction between the short-term and the long-term adjustment period was assumed to rest on the matter of depreciation reserves. In the short-term adjustment, these reserves were considered to be available for family living, thus assuming a perpetual loan insofar as depreciable assets are concerned. The long-term adjustment, however, was assumed to provide for setting aside depreciation reserves so that depreciable assets could be replaced without the need to refinance. The specific assumptions concerning principles of credit use were as follows:

3.4.1 Family Living Standards in the Long-Term Adjustment Period

1. The operator's equity influences the level of family living standard during the repayment period (at a given rate of interest and return to labor and capital) only in relation to the term of the loan, and its size:

(a) The shorter the loan period, the larger must be the operator's equity in relation to capital borrowed, if the desire is to maintain a minimum family living standard during repayment of the loan.

(b) The lower the operator's equity, the larger must be the overall capital borrowed (providing the money will be put to profitable use) if a minimum standard of living is to be maintained during a fixed repayment period.

(c) Where the term of a loan is so short that annual repayment of principal and interest per dollar borrowed exceeds the net farm income return to capital, credit can be used only by accepting a decrease in the family living standard during the repayment period.

2. Where the repayment term is long enough so that annual repayment of principal and interest per dollar borrowed is less than the return to labor and investment per dollar invested, the effective ceiling on maximum loans will be independent of the operator's equity, and will instead be determined by marginal value productivity of the production alternatives.

3. The lower the rate of interest charged on borrowed capital, the smaller is the required ratio of operator equity to total capital in terms of maintaining a minimum family living standard.

4. The higher the potential return to labor and investment, the lower need be the required ratio of operator equity to total capital in order to maintain a minimum living standard during the repayment period.

5. The higher the minimum standard of family living desired during the repayment period of a loan, the greater must be the operator's equity in relation to total capital.

34.2 Family Living Standards in the Short-Term Adjustment Period

1. All factor relationships expressed for the long-term adjustment will also hold for the short-term adjustment.

2. The larger the ratio of depreciable assets to non-depreciable assets, the greater will be the available short-term living allowance with respect to the long-term living allowance. From this, it follows that:

(a) The larger the ratio of depreciable assets to non-depreciable assets, the larger can be a loan with respect to the operator's equity,

while maintaining a fixed standard of family living during the repayment period.

(b) The shorter the depreciation life-time of the depreciable asset, the larger can be a loan with respect to the operator's equity, while maintaining a fixed standard of family living during the repayment period.

3. The larger the ratio of depreciable assets to non-depreciable assets, the greater is the extent of perpetual financing required where depreciation reserves are used for family living.

3.4.3 Factors Affecting Net Farm Income

1. The ratio of operator equity to total capital bears no relationship to net farm income. Money can be profitably borrowed irrespective of operator equity as long as marginal returns exceed marginal costs.

2. The term of the loan is independent of the net farm income level.

3. Net farm income will vary with the use to which the loan is put as well as its size.

3.5 Assumptions Regarding a Hypothetical Program of Intensification Credit

In attempting to formulate a program for assisting the low-income farmer through the use of intensification credit, it was assumed that two distinct problem areas existed. In the first place, it was recognized that a sizeable portion of the low-income farmers are at an age where they

can probably only expect to farm in the neighborhood of 10 to 15 more years. Many of the remaining low-income farmers, however, were assumed to fall into the category of operators still having sufficient time left to develop economic farm units. This situation suggested that the use of intensification credit might best be directed to raising income levels through use of two separate credit programs - a short-term adjustment program and a long-term adjustment program.

For the older farmer having only a limited time left to farm, it was assumed that the objective of making credit available was to maximize family living standards during the short-run time period, without regard to the equity position of the farmer at the cessation of farming. In contrast to this, credit to the younger farmer was considered to best serve its purpose if used to maximize net farm income in the long run. It was hypothesized that two different types of credit programs were, in fact, required to meet the contrasting goals of maximum net farm income and maximum family living standard. It was further hypothesized that credit designed to maximize net farm income for the younger farmer would enable the formation of an economic farm unit through use of conventional credit at some time in the future.

Specific details for both the short-term and the long-term loan programs were based largely on the assumptions reached with regard to principles underlying the use of intensification credit. In both programs, it was assumed that operators having an equity in their farm of $20,000 or more, could be eligible for conventional credit, and would thus be excluded from this program. An implicit assumption throughout this

study was that in administering the credit programs, careful screening would be used to determine if, in fact, continuation of farming was the most suitable alternative to follow in each instance.

3.5.1 The Short-Term Adjustment Program

The basic objective of the short-term adjustment program was considered to be that of providing supervised intensification credit for the purpose of maximimizing family living standards. The loan would be directed to the older farmer who would be ceasing farming operations in approximately 10 years. A program of this nature was considered to be adjustment-orientated in that the chronic low-income farmer could be given an increase in living standards (without the need for welfare assistance) until such time as he ceased farming and his land became available for consolidation purposes.

Loans for the short-term adjustment program were considered to be terminal loans, as it was assumed that no depreciable assets would be replaced, thus allowing the farmer to live off his depreciation for the purposes of increasing living standards. The financing of assets requiring extensive capital accumulation were assumed to be best excluded from this type of loan to ensure that the immediate goal of all credit would be to bring an increase in the present family living standard.[2/] As such, it was recognized that net farm income would not necessarily be maximized, nor would the farmer's equity position be necessarily increased during the period of assistance.

2/ The purchase of depreciable capital assets in the short-term adjustment period was considered to require only modest amounts of net capital accumulation since the annual depreciation was considered available to help repay the loan. Purchase of non-depreciable capital assets, on the other hand, would represent "extensive" capital accumulation since all of the principal repayment on these items would come directly from net farm income.

The basic assumptions of the short-term loan program were as follows:

1. Term of Loan:

It was assumed that this loan program would be directed only to low-income farmers in the 55 year age bracket and over. Maximum term of loan was established at 10 years or to age 65, whichever was the lesser time.

2. Purpose of the Loan:

Since the assumed purpose of the loan was to maximize family living standards, it was felt that it must be directed to those uses which would do most to increase income available for family living, rather than net farm income. Emphasis was thus placed on uses requiring little or no net capital accumulation, and on uses involving depreciable assets. Also, since the loan was assumed to be responsible for facilitating adjustment out of agriculture, it was decided that it should not be directed to uses whose value would be largely lost upon later consolidation with another farm. This was deemed to refer principally to building and land improvements which would not normally be utilized in an expanded unit. Against this background, it was assumed that the loans should be for the following purposes:

(a) Purchase of machinery and equipment.

(b) Purchase of livestock.

(c) Building repairs and minor renovations.

(d) Cash operating inputs (fertilizer, sprays, etc.).

3. Size of Loan:

With a maximum allowable repayment period of only 10 years, it was felt that the size of the loan must be closely related to both the operator's equity and the time left for repayment. It was assumed that a

farmer must have upon receipt of the loan, an equity equal to 60 percent of the total owned capital invested, plus 2 percent for each year the operator exceeds 55 years of age. This minimum level of operator equity was arbitrarily obtained from a study of the mathematical relationships involved in the use of credit (Section 3.3). These relationships indicated that the annual amortized repayment per dollar borrowed (interest and principal), must be less than the expected return to labor and investment per dollar borrowed, if family living standards are to be at a maximum during the repayment period. Since the short loan period assumed for this credit program involved high annual repayment rates, it was felt that the credit supply should be restricted relative to the operator's assets to ensure that high marginal rates of return could be experienced. It was recognized that use of more credit could quite possibly have been justified from the standpoint of increased net farm income, but family living standards during the repayment period would not have been maximized if marginal returns to labor and investment fell below the annual amortization rate.

The following formula was established to permit calculation of each available loan, given the term available and the level of operator's equity.

Where,

C = Available credit

E = Operator equity, and

N = Term of loan, then

$$C = \frac{E\ (10 + N)}{40 - N}$$

4. Security Requirements:

Since the length of the loan period was assumed to largely determine the family living standard during repayment, it was felt that loans should be extended for as long a term as possible. This suggested a possible conflict, however, in that some assets are returned fairly quickly in the gross income and should thus have only a short loan period. For this reason, it was assumed that the best procedure would be to adopt a "package" loan secured by the whole farm. This would enable the maximum term of loan to be advanced (as determined in point 1) regardless of the use to which it would be put.

5. Flexible Repayment Provisions:

As a provision for meeting low-income years, it was assumed that a revolving loan fund should be made available to meet operating inputs and payments on the original loan during low-income years. Maximum loan available in this revolving loan fund during any one year was assumed to be 20 percent of the original loan extended.

6. Interest Rates:

Interest rate on the short-term loan fund were assumed to be best set at 6 percent on the basis of competitive market rates. The interest rate on the revolving loan fund was deemed best established at 7.0 percent because of the higher risk and administration charges involved.

3.5.2 The Long-Term Adjustment Program

The basic objective of the long-term adjustment program was considered to be the provision of intensification credit and management supervision for those farmers who have the potential for obtaining an economic unit, but

who are unable to acquire the necessary supervision and capital from present sources. The immediate purpose of each loan was assumed to be maximizing net farm income rather than family living standards. It was felt that the program would be adjustmental in nature since the loan purpose would not be to move the farm directly to an economic status, but to enable the operator to gain the resources and experience needed for later graduation to conventional credit. An implicit assumption of this program was that the farmer and his family would actually choose to sacrifice some degree of family living standard in the present for the sake of an improved living standard in the future.

The basic assumptions used in the long-run adjustment program were as follows:

1. Purpose of the Loan:

Inasmuch as this loan was designed to provide the basis (through intensification credit and management supervision) for future expansion to an economic unit, it was decided that the loans should be available for whatever form of intensification use that would yield the highest net farm income. It was, therefore, assumed that loans would be available for all purposes <u>except</u> land purchase.

2. Term of Loan:

Since this loan program was developed for the purposes of maximizing net farm income, a fairly long term loan was felt necessary in order to cushion family living standards during the repayment period. Assuming net farm income returns of 10 to 12 percent per year, it was estimated that a 20 year loan would be necessary to minimize the loan repayment effects on family living standards. At this term of loan, an annual amortized

payment of 8.024 percent of the original loan would be required on the basis of a 6 percent rate of interest on the borrowed money. This would provide a 2 to 4 percent margin between the net farm income return to capital and the annual amortized payment per dollar borrowed, thus ensuring that living standards could be maintained during the loan repayment. It was assumed that no loan could be extended for repayment beyond age 65.

3. Size of Loan:

Assumptions developed earlier regarding the use of credit suggested that where maximum net farm income is the objective, the operator's equity position would have no bearing on the size of the loan. It was felt, however, that operator equity does have a bearing on the size of the loan when considering repayment capacity during a low-income year. In order to provide a security cushion against low-income years, it was assumed that the operator's equity must be a minimum of 40 percent of the total owned capital after the loan is made, plus 2 percent for every year the operator exceeds 45 years of age. Maximum available loan was assumed to be $20,000.

Calculation of available loan limits as based on the term of the loan and the operator's equity was facilitated through use of the same formula as developed for the short-term loan program.

4. Security Requirements:

It was assumed that the interest of both the borrower and the lender would be best served by a single "package" loan based on the security of the whole farm. This would permit an extended term for the purchase of many assets where the normal depreciation life-time is less than the maximum allowable term of 20 years.

5. Flexible Repayment Provisions:

Provision for flexible repayment was considered to be best met by having a revolving loan fund. This would be used to extend credit during low-income years for meeting the original loan payment as well as operating inputs for the year. Loans taken under the revolving loan fund were assumed to be limited to a one year basis. Total money available during any one year was considered to be best set at 20 percent of the original loan.

6. Interest Rates:

Interest rates on the basic loan were assumed to be 6 percent. The revolving loan fund was assumed to carry an interest rate of 7.0 percent to compensate for added risk and administration charges.

7. Disbursement and Supervision:

It was assumed that although the entire loan would be authorized initially, credit would be disbursed only as needed to develop the farm program. Supervision was considered a prime requirement in order to ensure that the loans were used as originally sanctioned, and to assist the farmer in his day to day management problems. Subsequent installments of a loan were assumed to be contingent on the proper use of preceding sums.

CHAPTER IV

AREA OF STUDY AND METHODOLOGY

4.1 Area of Study

During the summer of 1963, a Rural Development Questionnaire was completed for selected farmers within each of three Rural Development Areas. These areas, Broadview, Meadow Lake, and Torch River, were designated as Rural Development Areas by the Province of Saskatchewan, under provisions of the Agricultural Rehabilitation and Development Act. The major purpose in initially establishing these three areas was to commence pilot studies in the general area of rural development, as provided for in the Agricultural Rehabilitation and Development Act. Each of the three areas contain a large number of low-income farmers and for that reason, offered ample scope for establishing the appropriate means by which the resources of the area, particularly the human resource, could be put to more efficient use.

The Rural Development Questionnaire was designed as a means of obtaining background data on the farmers located within each area. Each farmer selected for the survey was asked to disclose the scale and value of the physical resources available on his farm - land, buildings, livestock, and machinery. Considerable attention was also given to present management practices, plans for the future farm operation, present credit use and need for additional credit. Family and personal goals rounded out the Questionnaire. No attempt was made to obtain cost and returns data for the farms surveyed. Although this represented a serious short-coming in terms of this study, it was originally intended that the

survey provide only general background data on the area. This made it possible to gather the required data at a minimum cost and within a workable time limit.

The data outlined in the Questionnaire were prepared in sufficient detail so that an adequate appraisal could be made of the present farming situation. From this appraisal, expectations were that programs could be established to meet the adjustment needs of the area.

The present study was directed to the use of intensification credit as a means of assisting in the adjustment problem of the low-income farmer. As such, it was felt that data collected in the Rural Development Surveys would provide a good background against which to evaluate assumptions concerning the use of this type of credit. With this in mind, the Rural Development Area of Broadview was selected as the general area of study for the purpose of this thesis.

The Rural Development Area of Broadview was selected as a pilot project under terms of the Agricultural Rehabilitation and Development Act, largely as a result of initial representations made by local people within the Broadview Area. A committee (The Broadview and District Development Committee) was organized in April of 1961, by the Broadview and District Chamber of Commerce, with the objective of studying the economic and social problems of the Area surrounding the Town of Broadview. A specific area was selected by the committee for purposes of conducting an economic survey. This area later became the official Rural Development Area of Broadview as provided for in the Agricultural Rehabilitation and Development Act. The general limits of the Rural Development Area were outlined as follows:

Township 15, Ranges 3-4-5 and E½ of 6

Township 16, Ranges 3-4-5 and E½ of 6

Township 17, Ranges 3-4-5 and E½ of 6

Township 18, Ranges 3-4-5 and 6

Township 19A, Ranges 3-4-5 and 6

The actual Rural Development Questionnaire as used in each of the Rural Development Areas was conducted by specially appointed enumerators selected for each area. Some 300 Questionnaires were taken, this representing a complete coverage of all resident farmers in the area. The Questionnaire was designed to provide information in several specific areas:

1. Land and Land Use Inventory:

Under this section, information was obtained from each respondent with regard to all land owned, rented and leased. For each parcel, data were collected concerning acres seeded to each crop, the number of cultivated acres, pasture acres, and the amount of future arable land on each parcel. Acquisition of each parcel was noted as well as the condition of the title at the time of interview. The municipal assessment was also obtained on each parcel of land.

2. Building, Livestock and Farm Equipment Inventory:

The condition of all major buildings on each farm was noted, in addition to the estimated market value at time of interview. Livestock numbers by class of animal were enumerated, as well as their values, again by class of animal. A considerable amount of data was also collected concerning the usual marketing pattern followed with regard to livestock. Also noted in the case of livestock was the use of off-farm pasture,

condition of the home pasture, chief source of roughage and grains, as well as the use of mineral and vitamin supplements.

Farm equipment was surveyed as to make, size, year purchased and year new for all major items of machinery on the farm. Values were later assigned to each machine on the basis of its age, size and make.

3. Present Farm Situation and Future Intentions:

Under this section, data were collected on such management practices as the use of manure and commercial fertilizer, and the keeping of farm records. Amenities in the home, including telephone, electricity, radio, television and plumbing, were enumerated. The respondent was further asked to indicate his intentions concerning future farming plans for the area or elsewhere, as well as his assessment of the present farm operation from the standpoint of size and labor supply.

Considerable attention was given to getting some indication of the farmer's future intentions regarding increased livestock production, crop production, clearing and breaking plans, and plans for additional machinery purchases. In each instance, the farmer was asked to list three major farm adjustments in order of importance, as required to expand farm income. He was then asked to specify the amount of credit needed for each proposed adjustment.

4. Credit Uses and Needs:

A complete breakdown was requested of the farmer's present credit position, including production and consumption credit currently used, amount and date of original loan, and amount outstanding at the time of the interview. Credit agencies used in the past were recorded as well as an indication of those agencies where credit had been sought after but refused.

5. Family and Personal Information About the Respondent:

Each farmer was asked to list the members of his family, their age, present occupation, highest grade obtained in school and reasons why they did not go further in school. Where children still attended school, information was asked with regard to future intentions for these children. Each respondent was asked to indicate his age, the last grade completed in school and any additional schooling which he may have had. He was also asked to indicate what proportion of his total income was derived from non-farm sources.

4.2 Summary of Questionnaire Data Obtained for the Broadview Area

One of the objectives of this study was to determine the scope for a program of intensification credit in improving the status of the low-income farmer. For this reason, it was considered desirable to have fairly full documentation of the farms in the area, in order first, to assess the need for such a program, and secondly, to provide a background against which the proposals for a program of intensification credit could be tested. A fairly detailed analysis of the type of farming presently carried on, as well as future farming intentions, was also required in order to select the appropriate benchmark farms.

Although some 300 records were taken in the Broadview area, only 222 were complete enough for analysis purposes. These records were made available from the Economics and Statistics Branch of the Saskatchewan Department of Agriculture.

In initially summarizing the Questionnaire for the Broadview area, it was decided to stratify the reporting farms on the basis of total acreage, including both owned and rented land. It was felt that some

indication could be obtained concerning the potential for intensification credit, by establishing the present cultivated acreage, future arable land base, and the resource-use pattern in each size group. Stratification was on the basis of 320 acre increments.

As indicated in Table 9, a relatively low cultivated acreage as a percent of total acreage, existed in each of the size groups. Both the 0 to 320 acre and the 321 to 640 acre groups, for instance, had less than 57 percent of the total land base under cultivation, while the remaining two size groups had less than 50 percent under cultivation. The provincial average for cultivated acreage as a percent of total acreage, on the other hand, stood at 66.9 percent in the 1961 census.

Considerable scope for increased production within each size group appeared possible by means of additional clearing and breaking. Operators in the 0 to 320 acre size group estimated a possible increase in improved acreage of 28.2 percent, while the 321 to 640 acre group reported an additional 25.7 percent could be added to improved acreage. An even greater potential was reported in the 641 to 960 acre and the 961 and over acreage groups, with increases in improved acreage estimated at 34.5 percent and 42.3 percent respectively.

Two significant observations can be made from Table 10 - the relatively low machinery investment per farm and the advanced age of equipment, especially on the smaller size of farms. Although age and present value of machinery do not necessarily have a direct relationship to the farmer's productive efficiency, the chances for lower production output and higher costs of operation become measurably greater as the machinery reaches the advanced ages indicated in Table 10. Losses to the farmer by using

Table 9

Land Use Summary for Selected Farms in the Broadview Area, 1963

Item	Size in Total Farm Acres 0 - 320	321 - 640	641 - 960	961 & Over
No. of Farms in Group	52	91	51	28
1. Size and Value of Land (O & R):				
Total acres	275.1	537.4	845.4	1352.3
Total assessed value	$2477	$4840	$7383	$11549
Assessed value/acre	$9.00	$9.01	$8.73	$8.54
2. Cultivated Land (Acres):				
Grain Crops	87.0	169.3	230.2	352.6
Fallow	63.0	114.1	142.9	193.8
Tame grass	6.7	15.5	43.8	68.2
Total	156.7	298.9	416.9	614.6
Cultivated Acres as % of Total Acres	56.9%	55.6%	49.3%	45.4%
3. Native Land (Acres):				
Hay land	4.0	9.5	24.9	43.6
Open pasture	44.1	107.7	191.4	289.4
Bush pasture	30.0	77.5	142.6	284.8
Idle	40.3	43.8	69.6	119.9
Total	118.4	238.5	428.5	737.7
4. Future Arable Land (Acres):				
Open	9.5	19.6	36.7	41.2
Bush	23.2	49.1	90.2	194.9
Idle	11.5	8.1	17.1	23.6
Total	44.2	76.8	144.0	259.7
Future Arable Land as % of Cultivated	28.2%	25.7%	34.5%	42.3%
5. Rented Land:				
Total acres	39.4	89.9	249.4	307.6
Cultivated acres	17.7	41.5	91.5	115.0
Future arable acres	4.8	6.9	59.9	63.4

machinery of this vintage can come about through higher operating costs associated with wear and tear, and through losses in farm income brought about break-downs during critical use periods such as seeding and harvest. To a lesser extent, the losses may be of a more indirect nature, where quality and quantity of work is inferior to that of newer, more technically advanced machines. Lower overhead costs (depreciation and investment) associated with the older machine compensates to some extent for the higher operating costs.

Despite the relatively high age of practically all the machinery in the lower size groups, a strong tendency was noted for the purchase of second-hand equipment. In most instances, the time that a machine had been used by the farmer was considerably less than the actual age of the machine. In the 0 to 320 acre group, for instance, the average age of the machines listed in Table 10 was 11.5 years. These machines had been purchased for only 6.9 years on the average, however. The spread between age and age since purchased decreased considerably with increased farm size. In the 961 acre and over group, only 1.8 years separated the average actual age of the machines and the average time they had been in operation on the farm.

Cattle production, by and large, represented the main livestock industry reported in the Broadview area. In Table 11, hogs and sheep production, as reflected in inventory values, ranked well below cattle. Such cattle as were produced, however, were largely the product of the one section and over farms. Purchased cattle on feed were found to be fairly insignificant.

Table 10

Building, Machinery and Equipment Inventory, Broadview Rural Development Area, 1963

Item	Size in Total Farm Acres 0 - 320		321 - 640		641 - 960		961 & Over	
No. of Farms in Group	52		91		51		28	
	$		$		$		$	
1. Total Building Value	2599		4445		6221		9099	
2. Value of Machinery & Equipment:								
Power equipment	1671		2368		2933		4655	
Cropping & tillage equipment	500		842		1151		1436	
Harvesting equipment	704		1557		2293		2568	
Livestock equipment	30		138		200		312	
Total	2905		4905		6577		8971	
	Age	Age since Purchase	Age	Age since Purchase	Age	Age since Purchase	Age	Age since Purchase
3. Age of Selected Machines (Years):								
Truck	10.0	4.8	12.6	6.7	11.7	7.1	10.3	6.4
Tractor	12.9	7.9	10.9	7.2	10.1	7.0	8.2	6.0
Combine	10.6	5.1	11.3	7.4	10.9	7.8	8.8	7.1
Swather	9.1	7.8	11.1	7.6	10.4	8.1	10.2	7.3
Drill	14.8	6.4	14.5	9.4	15.1	9.7	11.5	9.9
Disker	8.0	4.7	5.8	4.5	6.7	4.3	5.9	5.4
Cultivator	10.2	6.0	8.5	6.6	7.6	6.0	7.0	6.4
Rodweeder	15.5	12.5	10.0	8.6	10.0	8.3	11.4	8.9
Baler	--	--	4.6	3.0	4.5	4.0	4.7	4.6
Average Age - All Machines	11.5	6.9	9.9	6.8	9.7	6.9	8.7	6.9

Table 11

Average Value of Livestock on Hand,
Broadview Rural Development Area, 1963

Item	Size in Total Farm Acres 0 - 320	321 - 640	641 - 960	961 & Over
No. of Farms in Group	52	91	51	28
	$	$	$	$
Value of cattle	1692	4201	8239	12,810
Value of hogs	39	61	147	75
Value of sheep	60	62	100	264
Value of other livestock	224	221	237	311
Total	2015	4545	8723	13,460

It could be argued that the low-income farmer problem in the Broadview area is due largely to a preponderant number of older farmers who will soon be retiring, thus alleviating the problem. As indicated in Table 12, however, only 13.5 percent of the farmers surveyed indicated their desire to retire in less than 5 years. This compared to 26.6 percent who indicated they would be farming for 5 to 15 years. Almost 60 percent (59.9) of the farmers surveyed expressed their intentions of farming for more than 15 years. To some extent, the picture was found to be somewhat better in the two smaller size groups, where 18.2 percent reported intentions of retiring in less than 5 years and a further 30.8 percent indicated retirement plans in 15 years or less.

Although there is a direct correlation between size of farm (measured by volume of production) and net income, 32 percent of the farmers in the two smaller size groups indicated satisfaction with their present

size of farm. Only 51.7 percent of the farmers in these two size groups desired an expanded farm size. This compares with 41.8 percent of the farmers in the two larger size groups who indicated a desire for additional farm size.

Acquisition of added land base is typically thought of as being the first means of obtaining increased size of farm. In the two smaller size groups, 30 percent of the farmers indicated satisfaction with their present land base, while 52.4 percent desired more land. These figures indicated a close parallel to the feelings expressed in the preceding paragraph with regard to size of farm. It is significant to note further that 62 percent of the farmers in the two larger size groups felt the need for more land, despite the fact that the cultivated acreage of these two groups was almost twice (1.97) that of the two smaller size groups.

Intensification represents the alternative to increased acreage when considering added size of farming operations. When questioned as to the desire to intensify through increased livestock production, over one-half of all the farmers (52.7 percent) indicated a desire to increase cattle numbers. Increased hog production came in a very poor second with only 7.7 percent of the farmers expressing a desire for increased production along this line. Less than 1 percent indicated a desire for additional sheep. Very little difference existed between the two larger size groups and the two smaller size groups with respect to desire for increased livestock production.

Each farmer was asked to indicate his first choice in increasing income, from a list of the nine alternatives indicated in section 5 of Table 12. In the two smaller size groups, 9.8 percent of the farmers

expressed a desire for increased crop acres as compared to 11.4 percent of the farmers in the two larger size groups. Increased cattle production turned out to be the number one choice in all size groups, with only a small percentage difference as between the two small size groups and the two larger size groups (32.2 percent and 35.4 percent of the farmers, respectively). Clearing and breaking ranked second among the farmers as the first choice to improve income. Again, both the two small size groups and the two larger size groups indicated similar desires for clearing and breaking. A total of 16.8 percent favored clearing and breaking as the first choice to increase income in the two small size groups as compared to 16.4 percent for the two larger size groups. Little emphasis was given in all size groups to the need for additional machinery as the first prerequisite to increased income.

One of the most direct and quickest means of expanding farm size is through the use of credit. In an effort to determine the credit use pattern for the farmers in the Broadview Rural Development Area, a number of questions were asked regarding credit utilization. These data are summarized in Table 13. In response to a question concerning attitude towards borrowing, 11.7 percent of the farmers indicated they were opposed to borrowing. The majority of those opposed to borrowing (80.8 percent) were from the two smaller size groups. Only 60.1 percent of the farmers in the 0 to 640 acre group put themselves on record as definitely favoring the use of credit, as compared to 81 percent for the farmers of 641 acres and over.

Table 12

Future Intentions, Farmers in the Broadview Rural Development Area, 1963

Item	Size in Total Farm Acres 0 - 320	321 - 640	641 - 960	961 & Over
No. of Farms in Group	52	91	51	28
1. Years Expected to Farm:				
No. indicating less than 5 Years	11	15	3	1
No. indicating 5 - 15 Years	15	29	7	8
No. indicating more than 15 Years	26	47	41	19
2. Feeling Regarding Size of Farm:				
No. indicating too large	0	0	0	1
No. indicating satisfactory size	14	32	26	17
No. indicating insufficient size	28	46	23	10
Unreported	10	13	2	0
3. Desire for More Land:				
No. not desiring more land	17	26	14	11
No. desiring more land	26	49	33	16
Undecided or not reported	9	16	4	1
4. Desire to Increase Livestock Numbers:				
No. desiring to increase cattle	25	49	30	13
No. desiring to increase hogs	5	5	6	1
No. desiring to increase sheep	1	0	1	0
5. First Choice to Increase Income:				
No. reporting nothing	4	14	11	7
No. desiring increased crop acres	8	6	5	4
No. desiring increased livestock	13	33	20	8
No. desiring improved water supply	3	4	3	1
No. desiring improved fodder supplies	0	1	0	0
No. desiring improved labor supply	0	0	0	0
No. desiring increased machinery	1	2	0	0
No. desiring increased fertilizer use	1	0	0	2
No. desiring clearing and breaking	9	15	9	4

As might be expected on the basis of both need and philosophy concerning credit use, the actual amount of both production and consumption credit increased with the larger size farms. Credit for land purchases increased at a significantly greater rate relative to machinery credit, as the size of farm increased. Credit for livestock played only a minor role in all farm sizes.

Each farmer was asked to signify the credit sources used in his farm business. Slightly over 13 percent of the farmers indicated that they used no credit whatsoever. This answer conformed closely to the 11.7 percent of farmers who indicated opposition to credit use. Again, 69 percent of the farmers not using credit were from the two smaller size groups. Private bank loans and loans under the Farm Improvement Loans Act accounted for the main source of credit, with Credit Unions occupying the third area of importance. A total of 42.7 percent of farmers in the 0 to 640 acre size group made use of private bank loans as compared to 60.8 percent for the 640 acre and over size group. Somewhat greater use of Farm Improvement Loans was found to be the case as compared to private bank loans for all but the 961 acre and over size group. Relatively little use was made of long-term credit offered by the Farm Credit Corporation and the Co-op Trust Co. Ltd. Only 14.7 percent of the farms of one section and under had obtained loans from the Farm Credit Corporation. This compares to 30.4 percent for the farms of one section and larger. Dealer credit for machinery purchases was used only in a minor way in all size groups.

The low volume of credit used by the farmers in the Broadview Rural Development Area did not appear warranted from the standpoint of the scope and desire for potential development in the area (clearing and breaking,

livestock expansion, new machinery). Three factors probably accounted for this situation; namely, reluctance to borrow, inability to borrow, and inability to borrow a sufficient quantity of money under appropriate terms. The reluctance to borrow was at least partially disclosed in the question asked of the farmer concerning his feelings towards credit use. An attempt was also made to establish what proportion of the farmers had actually applied for credit and had been turned down. Only 12 farmers out of the 222 surveyed indicated they had actually been turned down for a private bank loan. Only one farmer indicated that he had been refused a Farm Improvement Loan. In these instances, the bulk of the refusals were largely in the 0 to 640 acre size group (7 for private bank loans and 1 for the Farm Improvement Loan). Five farmers (all in the 0 to 640 acre class) indicated loan refusals from the Credit Unions. One farmer reported that he had been rejected by the Farm Credit Corporation. It appeared from this line of questioning that the low amount of credit used was at least partly accounted for by the fact that no application had been made for credit by many of the farmers, since the number of farmers indicating no credit use was considerably greater than those reporting refusal of credit. An important question, not answered by the survey, concerned what number of farmers might have been able to get additional credit, and at what level.

In any program designed to promote farm readjustment, the age of the farmers involved and their education level is an important consideration. Table 14 summarizes data on age and education of the operator, as well as his farming history and off-farm income.

It was found that in the 0 to 640 acre size group over one-third of the farmers (35.7 percent) were age 55 or better. This suggested that in

Table 13

Credit Use, Farms in Broadview Rural Development Area, 1963

Item	Size in Total Farm Acres 0 - 320	321 - 640	641 - 960	961 & Over
No. of Farmers in Group	52	91	51	28
1. Feeling Regarding Borrowing (No. Replying):				
No answer	13	13	4	1
Opposed	8	13	1	4
In favor	26	60	43	21
Undecided	5	5	3	2
2. Production Credit Use:				
	$	$	$	$
Total borrowed	1,468	2,117	3,947	7,229
Amount still owing	860	1,510	2,960	5,850
3. Breakdown of Prod. Credit Still Owing:				
	$	$	$	$
Land	425	1,071	2,413	4,743
Machinery	288	279	346	782
Livestock	---	66	49	107
Other	147	94	152	218
4. Consumption Credit Use:				
	$	$	$	$
Total borrowed	305	88	178	346
Amount owing	178	70	155	171
5. Credit Sources Used (No. Replying):				
None	8	12	6	3
Bank	19	42	27	21
Farm Improvement Loan	23	46	35	19
Credit Union	14	32	20	10
Farm Credit Corporation	8	13	13	11
Co-op Trust Co. Ltd.	0	1	0	0
Private Loans	2	6	5	2
Dealer Credit - machinery	0	4	2	1
Dealer Credit - fuel and oil	4	14	12	6
Store Credit	2	1	3	2

view of this age problem, special assistance programs to the older farmers within this size group could be a fairly significant problem. In the 641 acres and over size groups, only 17.7 percent of the farmers were age 55 or older. It was also discovered that only slightly more than one-quarter of the total farmers (26.1 percent) reported in the Broadview survey were under the age of 40. The most significant size group lay in the 40 to 55 year age bracket (44.6 percent).

The educational level of the farmer determines to varying degrees, his ability to properly manage his limited resources. In the Broadview area, only one-third of the farmers had completed more than grade 8 in school. A larger proportion of the farmers in the 641 acre and over size group had exceeded grade 8 than in the case of the 0 to 640 acre group (43 percent and 28 percent respectively).

A good indication of the progress that a farmer has made can be obtained by comparing the average starting acreage with the present acreage. It was found that the 0 to 320 acre size group had increased their farm acreage by less than 5 percent (4.6 percent) over a 16.1 year farming period. The 321 to 640 acre size group, on the other hand, added a 40.6 percent gain in acreage in approximately the same time period (17.8 years). Even more significant gains were noted in the larger size groups; the 641 to 960 acre size group increased their acreage by 83.7 percent while the 961 acre and over group added 124.6 percent increased acreage (although during a somewhat longer period of 20.1 years as compared to 15.9 years).

To some extent, the lack of farm size in the smaller size groups was offset by off-farm income. Whereas no off-farm income was reported in the 961 acre and over size group, the 0 to 320 acre size group showed 38.5

Table 14

Information About the Respondent, Broadview Rural Development Area, 1963

Item	Size in Total Farm Acres 0 - 320	321 - 640	641 - 960	961 & Over
No. of Farmers in Group	52	91	51	28
1. Age:				
No. not answering	2	0	0	1
No. under 24	2	1	1	0
No. between 25 and 39	8	19	18	6
No. between 40 and 54	23	37	27	12
No. between 55 and 64	10	20	0	6
No. 65 and over	7	14	5	3
2. Grade Obtained in School:				
No. not answering	0	0	1	1
No. with no schooling	1	2	1	0
No. finishing grades 1 - 4	5	9	4	1
No. finishing grades 5 - 8	33	53	23	14
No. finishing grades 9 - 10	7	20	19	7
No. finishing grades 11 - 12	6	7	3	5
3. Farming History:				
Average years of farming	16.1	17.8	15.9	20.1
Average size of farm at start (total acres)	263	382	460	602
Present size of farm (total acres)	275	537	845	1352
4. Off Farm Income Received: (as % of Total Income)				
Those reporting 0 percent	32	70	41	26
Those reporting 1 - 20 percent	2	7	6	0
Those reporting 21 - 40 percent	5	4	2	0
Those reporting 41 - 60 percent	6	7	1	0
Those reporting over 60 percent	7	3	1	0

percent of the farmers earning at least some off-farm income. A full one-quarter of this group earned 40 percent or more of their total income from off-farm sources.

4.3 Selection of Bench-Mark Farms

In order to test the basic hypotheses made with regard to the use of intensification credit, three bench-mark farms were established on the basis of operator's equity, using the data accumulated in the Broadview Rural Development Area. It was reasoned that the success or failure of a program of intensification credit would be determined to a considerable degree by the resource base owned by the farm operator. Also, since intensification credit, by nature of its definition, would exclude the purchase of land, then the degree of assistance possible would depend to a certain extent on the land base available for more intensive use. By selecting bench-mark farms covering a fairly wide range of capital resources, it was felt that considerable information would be gained as to the potential for intensification credit with regard to scale of operator's assets.

The three bench-mark farms selected for the study were based on averages of all farms surveyed in the Rural Development Questionnaire, who had $20,000 or less operator's equity. It was assumed that present long-term credit sources, with their emphasis on an economic unit, would require that a farmer have control of at least $40,000 at the conclusion of a loan. Under present lending practices, the value of a loan extended is usually in the range of fifty percent of the market value of the assets to be purchased. As a result, a farmer must be able to either meet the difference with cash, or offer security of his own equal

to the market value of the assets being financed. On the basis of this reasoning, a farmer having $20,000 or more net assets would be able to offer enough security for a $20,000 loan, which would then give him total controlled assets of $40,000. Accordingly, all farmers having $20,000 or more net assets were considered to be eligible for conventional credit, and excluded for purposes of analysis. A further requirement in selecting farmers for establishing the bench-mark farms was that no farmer control more than $30,000 total assets. This provision was designed to exclude those farmers having either large amounts of rented assets or the basis for an economic unit based on credit already in use.

A total of 84 farmers were found to meet the requirements of having $20,000 or less net farm assets and not more than $30,000 total assets controlled. The lower one-third of the farms in terms of operator equity were averaged to provide the basis for the bench-mark farm representative of the low equity small farm. In a similar fashion, the upper one-third of the farms by operator equity were averaged to obtain a bench-mark farm representing the high equity small farm. An average was then taken of all the farms (including the middle one-third equity group) to provide the basis for the bench-mark farm considered to be representative of the average equity small farm.

No consideration was given to the age of the operator or to the level of his rented assets (provided he fell within $30,000 total assets controlled) in selecting farms for each equity group. It was felt that the major requirements for analysis would be bench-mark farms outlining the complete inventory of resources available for production. Age of operator and level of rented assets, although important from the standpoint of

assessing the impact of the program in the area, were not considered relevant insofar as establishing the physical production base needed for budgeting and analysis. Table 15 outlines the total land use pattern for each equity group. Rented land use is contained in the table by way of comparison between the three bench-mark farms.

Each farmer surveyed in the Rural Development Questionnaire was asked to value the inventory items at his disposal. Present value estimates were taken of livestock, machinery and equipment, and buildings and improvements. Assessed land values were obtained for each parcel of land and converted to present market value on the basis of twice assessed value. Information was also collected on the value of rented assets, and on the extent of the operator's liabilities for production credit. These data were used in arriving at the operator's net assets, when selecting farmers for inclusion in the three bench-mark farms. Table 16 outlines for each equity group, the value of inventory assets, the value of rented assets, and the extent of operator liability.

4.4 Methodology

The primary analytical tool selected for use in this study was the technique of linear programming. Three reasons existed for this choice:

1. It was hypothesized that supervised intensification credit could upgrade the income position of the low-income farmer to the point where the younger farmer could accumulate resources needed for conventional credit, and the older farmer could be given a substantially increased standard of living until retirement. The testing of this hypothesis required that the effects of credit use be studied under a situation of optimum resource allocation before and after the introduction of credit. Linear programming

Table 15

Land Resource Base by Level of Operator Equity, Bench-Mark Farms

Item	Size of Bench-Mark Farm by Operator's Equity: Low Equity $0 - $10,000	Average Equity	High Equity $14,501 - $20,000
No. of Farms	27	84	28
1. Total Land Use Pattern:	Acres	Acres	Acres
Crop acres	138	215	235
Tame grass	6	14	20
Total Cultivated Acres	144	229	255
Native land	156	209	250
Total Acres	300	438	505
2. Native Land Use Pattern:			
Open pasture	72	103	108
Bush pasture	46	70	110
Idle land	38	36	32
Total Native Land	156	209	250
3. Future Land Use Potential:			
Arable open pasture	12	29	44
Arable bush pasture	17	41	71
Arable idle land	17	10	5
Total Potential for Arable Land	46	80	120
4. Rented Land Use:			
Cultivated acres rented	39	50	26
Native acres rented	69	60	40
Total Rented Land	108	110	66

Table 16

Value of Farm Capital and Operator Liability, by Level of Operator Equity, Bench-Mark Farms

Item	Size of Bench-Mark Farm by Operator's Equity: Low Equity	Average Equity	High Equity
	$	$	$
Land	4,580	7,090	7,660
Buildings & Improvements	1,560	2,590	3,900
Machinery & Equipment	2,220	3,270	3,920
Livestock & Poultry	1,770	3,620	4,280
Total Assets Controlled	10,130	16,570	19,760
Less Operator's Liabilities (Prod. Credit)	1,770	2,000	1,910
= Net Assets Controlled	8,360	14,570	17,850
Less Rented Assets	1,520	1,930	770
= Operator's Net Assets	6,840	12,640	17,080

offered this means of comparing income before and after the use of credit, with optimum resource use in both instances.

2. It was hypothesized that two distinct types of credit programs were needed, depending on whether the purpose was to increase the living standard of the older farmer, or to provide the younger farmer with an added income base as a prerequisite for accumulating the assets needed for conventional credit. In order to evaluate the alternative lending procedures assumed for each credit program, a detailed resource-use study was needed of the bench-mark farms. This detail, complete with a study of marginal value

products, was available through the use of linear programming.

3. Specific assumptions were made as to the relationship between size of loan, term of loan and operator equity. Linear programming offered the means of establishing an optimum resource use pattern for each bench-mark farm. The effects of each assumption could thus be studied, with full assurance that the results would not be distorted by less than optimum use of resources in one instance as compared to another.

4.4.1 Assumptions Used in Linear Programming

A number of basic assumptions regarding farm production practices were made in establishing the linear programming models used in this study:

1. Data on production practices for the farmers in the Broadview area suggested that the majority of the low-income farmers were considerably less than progressive in their overall farming methods. It was therefore decided that farm operations requiring additional labor and feed, over what the farm itself would be capable of producing, should be excluded from the enterprise alternatives built into the linear programming model.

2. Only "average" cultural methods were assumed likely to be used by the farmer. Intensive land use through fertilizer application and specialty crops was excluded from the programming models.

3. Livestock and machinery reported in each bench-mark farm were considered to be available for immediate sale, with the objective of establishing a capital fund to allow for the possibility of more optimum resource use through linear programming. In all instances except the low equity bench-mark farm programmed without credit, a basic line of machinery was assumed purchased with money resulting from the liquidation of original

livestock and machinery.[1/] The basic line of machinery consisted of a tractor, cultivator, rodweeder, harrows, packer, swather and discer.[2/] This equipment was assumed purchased at approximately half-life, for purposes of minimizing capital requirements. Combining, haying operations, and spraying were assumed hired on a custom basis.

4. Provision for additional building requirements was made for both grain and livestock operations. Buildings originally listed in each bench-mark farm were entered in the resource restrictions of each program.

5. Community pasture services were considered to be available to each bench-mark farm on the basis of 30 cow-calf units.

6. Clearing and breaking was assumed possible up to the limits outlined in the resource restrictions for each farm.

7. All bench-mark farms were considered to be completely owned for purposes of programming.

4.4.2 General Outline of Linear Programming Models

Two linear programming models were assembled for this study. The first programming model was designed to give the resource-use pattern needed for maximum net farm income. This model was designed so that with slight modifications, a second linear programming model could be evolved for the purpose of maximizing family living standards, rather than net farm income. Both models used an identical technology matrix.

1/ When programming the low equity bench-mark farm for optimum resource use without credit, the original machinery complement was retained in order to allow a greater supply of owned capital.

2/ See Appendix D for detailed description of machinery sizes and capabilities.

The linear programming model designed to maximize net farm income was used for the purpose of comparing income levels of each bench-mark farm, before and after credit use. This data served as the basis for assessing the potential of intensification credit in the low and high equity bench-mark farms. The programming model designed to maximize family living standards served a single purpose - to test the hypothesis that two alternative lending programs are needed, depending on whether the objective is maximum family living standards or maximum net farm income. The average equity bench-mark farm was used as the data base for testing this hypothesis.

Both programming models contained a credit repayment activity. In the program designed to give maximum net farm income, this activity was not allowed to function. When programming for maximum family living standards, however, the repayment activity was activated on the basis of the number of years assumed available for repayment of borrowed money. Adding back annual depreciation allowances to the net income for each enterprise completed the modification required to enable programming for maximum family living standards rather than maximum net farm income. Basically, money could be borrowed under this program only when the returns from its use (including depreciation reserves) exceeded the cost of borrowing it plus the annual principal repayment required on the basis of the repayment term selected. Depreciation reserves were added back on an enterprise basis to "force" the use of credit into activities requiring more depreciable assets, which could be used by the farmer for increasing his standard of living during the short run.

It was hypothesized that a program designed to maximize family living standards in the short run would give a different resource-use pattern than would the program designed to maximize net farm income. Comparison of the resulting resource-use pattern, net farm income levels and family living standards, it was assumed, would enable specific conclusions to be drawn as to the original hypothesis.

44.3 Resource Restrictions Used in Linear Programming Models

Both models were designed for 25 resource restrictions. These resource restrictions, and the levels allowed for each bench-mark farm are outlined in Table 17.

A maximum of $20,000 credit was assumed available for use by each bench-mark farm. In addition to this, each farm had a supply of investment capital as calculated by liquidating the livestock and machinery inventories and deducting the $3,444 assumed necessary for the purchase of a second-hand line of basic equipment. All grain and roughage supplies were set at zero to ensure that the resulting farm plan would be self-sufficient with regard to these items. The supply of April-May labor was calculated on the basis of 40 days effective labor at 12.5 hours per day. The annual labor supply was established on the basis of 200 hours per month.

In all instances, the value of livestock buildings shown for each bench-mark farm was doubled to provide the starting level of livestock housing. It was assumed that these buildings were valued on the average, at approximately half-life. Since building investment requirements by enterprise were based on replacement cost, it was considered necessary to convert the original building value to a capacity basis measured in terms

Table 17

Summary of Resource Restrictions and their Level, By Bench-Mark Farm

Resource	Unit	Resource Level By Size of Bench-Mark Farm		
		Low Equity	Average Equity	High Equity
Owned Working Capital	$100	-	-	-
Owned Investment Capital	$100	17.7 and 5.43 b/	34.5	47.56
Credit Supply Fund a/	$100	200.0	200.0	200.0
Crop Acres	Acre	138.0	215.0	235.0
Tame Grass	Acre	6.0	14.0	20.0
Open Pasture, Not Arable	Acre	60.0	74.0	64.0
Bush Pasture, Not Arable	Acre	29.0	29.0	39.0
Idle Land, Not Arable	Acre	21.0	26.0	27.0
Arable Open Pasture	Acre	12.0	29.0	44.0
Arable Bush Pasture	Acre	17.0	41.0	71.0
Arable Idle Land	Acre	17.0	10.0	5.0
Mixed Hay Supply	Ton	0	0	0
Native Hay Supply	Ton	0	0	0
Wheat Supply	Bus.	0	0	0
Oat Supply	Bus.	0	0	0
Barley Supply	Bus.	0	0	0
April - May Labor	Hour	500.0	500.0	500.0
Total Annual Labor	Hour	2400.0	2400.0	2400.0
Livestock Housing	$100	6.1	9.4	12.8
Grain Storage	100 Bus.	23.67	33.0	37.36
Community Pasture Privilege	Acre of Native Open Pasture	180.0	180.0	180.0
Pasture Supply	Acre of Native Open Pasture	0	0	0
Straw Supply	Ton	0	0	0
Credit Repayment	$100	0	0	0
Grain Sales Quota	Bus.	1000.0	1600.0	1800.0

a/ Credit Supply Fund was set at zero during initial programming for purposes of establishing income level prior to use of credit.

b/ When programming for maximum net farm income with no credit available for use, the low equity bench-mark farm was given 17.7 units of owned capital. This represented the disposal value of the livestock. Programming for this same farm with $20,000 credit supply, however, was allowed only when the original machinery ($2,220) was traded in on new machinery ($3,444). The net cost of the new machinery reduced the owned capital supply to 5.43 units.

of replacement cost. Grain storage was equated to bushels capacity to conform to the data obtained in the Rural Development Questionnaire.

Both community pasture privileges and pasture supply were expressed in terms of an acre of native open pasture. This unit of measurement was necessary in order to facilitate handling pasture requirements by the various classes of animals. Straw supply, as in the case of feed and roughage, was set at zero to ensure that all requirements in the final plan were met by the farm's own production.

The credit repayment resource level was set at a zero level figure to ensure that all money borrowed would be repaid, when programming for maximum family living standard. The final resource restriction, grain sales quota, was incorporated into the program to ensure that grain sales would be geared to a "normal" quota situation.

44.4 Description of Real Activities

Each linear programming model was constructed on the basis of 41 real activities.[3/] Although each model contained the same activities, the credit repayment activity was not allowed to be operational when programming for maximum net farm income.

It was elected to incorporate five alternative crop rotations into the programs, involving a production range of wheat, oats, barley, and grass-alfalfa. Prebudgets were established for each rotation to arrive at values for the total variable costs. All cereal grain was valued at market prices.

3/ See Appendix F for a complete description of each activity.

Production of grass-legume crops, however, was not valued directly, but allowed to seek its value through the production of livestock.

Four beef-cattle operations were entered into the final program. In all instances, the finishing of market animals was assumed restricted to home production, with no provision for purchases. The beef-cattle operations consisted of a cow-calf operation, a finished calf, a feeder yearling off grass and a finished yearling operation.

Two hog operations completed the enterprises selected for inclusion in the linear programs. These consisted of a single-litter summer farrowing hog operation and a year around double farrowing hog operation.

The remaining thirty real activities were incorporated into the programs to facilitate the adjustments assumed available to the operator in the course of his farming operations. Provision was made for the sale of surplus wheat, oats, and barley through selling activities for these items. A feed grain substitution activity was also introduced to allow surplus barley production to be substituted for oats in the livestock feeding operations.

A total of three clearing and breaking activities were introduced into the matrix to allow arable open pasture, arable bush pasture and arable idle land to be converted to cropland use. In addition to these activities, a straight clearing activity was established to clear bush pasture for purposes of expanding home pasture supplies. Since each bench-mark farm originally had a supply of tame grass, a rebreaking activity was incorporated into the matrix in the event that this land should have a higher potential in grain production.

Seven activities were brought into the program, for the purpose of

adding to the supply of available pasture. These activities served simply to ensure that all land not used for grain production would be available for production of livestock. Pasture supply was further supplemented by an activity permitting the rental of community pasture grazing land up to a maximum of 180 acres - equivalent of native open pasture (30 cow-calf units).

Provision for necessary roughage supplies was made through inclusion of a straw baling activity, four native-hay production activities and one tame hay production activity. The production of hay was allowed to compete with land available alternatively for pasture or grain production. A roughage substitution activity was introduced to allow the native hay supply to be substituted for the tame hay requirements listed for the livestock operations.

No provision was made for the purchase of either additional machinery or larger machinery. It was assumed that the basic machine complement selected would be sufficiently large to meet the needs of all three benchmark farms at the labor supply available in each instance. Provision was made, however, for the purchase of both livestock buildings and grain storage facilities as needed.

Four final activities were introduced to round out the matrix for each linear programming model. A borrowing activity was listed for each of working capital and investment capital. These two activities were supplemented by a capital substitution activity designed to ensure that any surplus owned investment capital would be made available as working capital. A final activity, credit repayment, was built into the matrix so that the model could be used to program for maximum family living standard. The credit repayment activity was not activated at any time while programming for maximum net farm income.

4.4.5 Prices Used in the Linear Programming Models[4/]

Livestock prices were based on the Winnipeg market at average levels established over the five year period from 1958 to 1963. Grain and feed prices were based on prices applicable to the Broadview shipping point. These prices were based on a 10 year average from 1954 to 1963. All interim and final prices were included in the final grain prices.

4.4.6 Physical Production Data Used in the Linear Programming Models

Grain yields were established for R.M.s number 124 and 154 over a 20 year period from 1944 to 1963. The average municipal yields obtained from the Secretary of Statistics, Saskatchewan Department of Agriculture, were converted to a stubble and summerfallow yield basis by using the provincial fallow-stubble yield relationship for the period from 1957 to 1963.

Hay yields and pasture carrying capacity were based directly on the reported grain yields for the area. Complete details of these relationships are outlined in Appendix A.

4/ See Appendix B for grain and livestock prices used in the programming models.

CHAPTER V

ANALYSIS

Analysis procedures used in this study were developed to test hypotheses and examine basic assumptions made with respect to two distinct areas:

1. The effectiveness of the proposed credit program as a means of increasing family living standards in general, and of enabling younger farmers to accumulate sufficient capital for later graduation to conventional credit.

2. The validity of the operational aspects assumed for the proposed credit program from the standpoint of the relationship between size of loan, term of loan and operator's equity, and from the standpoint of interest rate charges, provision for flexible loan repayments, and purpose of loan as between short and long-term objectives.

5.1 Analysis Procedures and Results Regarding the Effectiveness of the Proposed Credit Program

In assessing the effectiveness of a program of intensification credit insofar as raising family living standards, linear programming was used to establish net farm income under optimum resource allocation, both with and without the provision of credit. The high equity bench-mark farm and the low equity bench-mark farm were selected as the basis for programming. The resulting farm resource structure for both farms under unlimited credit supply, was then used as the basis for an analysis of the potential offered by the credit program, from the standpoint of enabling younger farmers to accumulate the capital resources needed for conventional credit.

5.1.1 Intensification Credit and its Effect on Family Living Standards

The low equity bench-mark farm and the high equity bench-mark farm were chosen to give a representative indication of the effect that intensification credit could have in raising family living standards of the small farmer with low equity and the small farmer with high equity. In order to establish a basis for comparison, both bench-mark farms were programmed first to give maximum net farm income from owned resources available to the operator. These farms were then reprogrammed for maximum net farm income on the basis of $20,000 credit being available to each farm at six percent interest. By programming all available resources with the purpose of maximizing net farm income, the resulting income level comparisons enabled measurements to be made entirely in terms of the effect of the additional credit. The resource structure indicated in the last iteration of each program was used to reconstruct a farm income summary, from which a level of family living standard was subsequently developed for alternative repayment periods.

When programming both farms under zero credit provisions, an owned investment fund was assumed created by liquidation of the livestock. In the high equity bench-mark farm, the available machinery complement of $3,920 was also assumed liquidated and used to buy a basic machine complement worth $3,444. The remaining balance of $476 was added to the livestock value to provide a fund for investment capital. No machinery liquidation was assumed for the low equity bench-mark farm since machine use was considered less critical at this scale of farming. A total of $1,770 was allocated to investment capital for the low equity farm as compared to $4,756 for the high equity

farm. The linear programming model made provision for transferring the investment capital supply to working capital as required.

Table 18 outlines the effect of added credit on the farm resource structure and land use pattern of both the low and high equity bench-mark farms.[1/]

Strong additional returns with the use of credit were indicated in both the low and high equity bench-mark farms. The relative increase in net farm income was considerably higher in the case of the low equity farm (354.8 percent) than that of the high equity farm (207.6 percent). Table 19 outlines the income summary for both farms, before and after the use of credit.

In an effort to establish family living standards available to each size of farm during the debt repayment period, the credit borrowed in each instance was assumed repayable on an amortized basis over a period of 5, 10, 15 and 20 years. Interest was assumed to be six percent in all cases. The resulting family living standards represent the income that would be available to the farmer and his family for living expenses during the repayment period of the loan. Continuity of farm operation would be assured at this level of living since full provision was made for replacement of depreciable assets in addition to charging out cash operating costs. Table 20 illustrates the family living standard available to each size group, during selected repayment periods.

1/ See Appendix I for the detailed programs of the farm operation before and after the use of credit.

Table 18

Comparison of Farm Resource Structure and Land Use, Before and After Use of Credit, Low and High Equity Bench-mark Farms

Item	Size of Bench-mark Farm by Operator Equity			
	Low Equity		High Equity	
	Without Credit	With Credit	Without Credit	With Credit
1. Credit Used:	--	$12,148	--	$11,026
2. Investment Relationships:	$	$	$	$
Land	4,580	6,336	7,660	11,342
Buildings & improvements	1,560	3,564	4,167	5,498
Machinery & equipment	2,220	3,444	3,444	3,444
Livestock & poultry	264	5,435	1,690	5,765
Total Inventory Capital	8,624	18,779	16,961	26,049
Working Capital Used in Program	1,506	3,496	2,799	4,737
Sub-Total a/	10,130	22,275	19,760	30,786
Plus Additional Working Capital	190	35	360	204
Total Capital Requirements	10,320	22,310	20,120	30,990
3. Land Use:	Acres	Acres	Acres	Acres
Seeded Acreage:				
Wheat	44.7	24.0	80.4	116.0
Oats	16.0	21.7	24.8	13.1
Barley	16.0	30.2	24.7	44.4
Total Seeded Acres	76.7	75.9	129.9	173.5
Summerfallow Acreage:	60.7	45.8	105.1	129.0
Total Crop Acres	137.4	121.7	235.0	302.5
Tame Grass Acreage:	6.0	68.3	20.0	72.5
Total Cultivated Acres	143.4	190.0	255.0	375.0
Native Land	156.6	110.0	250.0	130.0
Total Acres	300.0	300.0	505.0	505.0

a/ Working capital requirements indicated in each linear program were adjusted to include operating capital considered fixed for purposes of programming, and to exclude depreciation charges on machinery and building purchases required during the course of the programming.

Table 19

Summary of Income and Expenses, Before and After Use of Credit, Low and High Equity Bench-mark Farms

Item	Size of Bench-mark Farm by Operator Equity			
	Low Equity		High Equity	
	Without Credit	With Credit	Without Credit	With Credit
1. Gross Income:	$	$	$	$
Crops	2,078	1,691	3,566	4,633
Livestock	852	5,328	2,364	5,651
Total Gross Income	2,930	7,019	5,930	10,284
2. Costs of Production (less labor):				
(a) Cash Operating:				
Crops	787	810	1,334	1,801
Livestock	670	2,540	1,362	2,675
General overhead	240	259	404	452
Total Cash Operating	1,697	3,609	3,100	4,928
(b) Depreciation:				
Buildings & improvements	78	178	208	278
Machinery & equipment	340	340	340	340
Total Depreciation	418	518	548	618
(c) Investment:				
Av. inventory @ 5%	431	939	848	1,302
3. Income Summary:				
Gross Income	2,930	7,019	5,930	10,284
Less Cash Operating	1,697	3,609	3,100	4,928
= Returns Over Cash Operating	1,233	3,410	2,830	5,356
Less Depreciation	418	518	548	618
= Net Farm Income	815	2,892	2,282	4,738
Less Investment Cost	431	939	848	1,302
= Operator & Family Labor Income	384	1,953	1,434	3,436

Table 20

Family Living Standards During Loan Repayment Period, Basis Selected Repayment Terms, Low and High Equity Bench-Mark Farms

Item	Size of Bench-mark Farm By Operator Equity	
	Low Equity	High Equity
	$	$
1. Total Borrowed Capital	12,148	11,026
2. Annual Amortized Payment @6% Interest:		
(a) Basis 20 yr. repayment period	1,059.12	961.30
(b) Basis 15 yr. repayment period	1,250.79	1,135.27
(c) Basis 10 yr. repayment period	1,650.52	1,498.08
(d) Basis 5 yr. repayment period	2,883.89	2,617.53
3. Net Farm Income Level	2,892.00	4,738.00
4. Family Living Standard During Repayment Period:		
(a) Basis 20 yr. repayment period	1,833	3,777
(b) Basis 15 yr. repayment period	1,641	3,603
(c) Basis 10 yr. repayment period	1,241	3,240
(d) Basis 5 yr. repayment period	8	2,120

5.1.2 Intensification Credit as a Means of Accumulating the Capital Required for Conventional Credit

It was hypothesized that a program of supervised intensification credit would make it possible for the younger farmer to accumulate the assets needed to qualify him for conventional credit at a later date. In this connection, it was considered that in order to qualify for conventional long-term mortgage credit, a farmer must have accumulated a minimum of $30,000 net assets by

the age of 45.[2/] It was further assumed that this capital accumulation would take the form of increased equity in the farm business, but could be supplemented by either additional investment within the farm business or by a separate investment fund external to the farm business.[3/] Added investment capital either in the farm or in extra-farm investment portfolios was considered to be capable of yielding 6 percent compound interest.

Both the low and high equity bench-mark farms were used as the basis for this stage of the analysis. The farm resource structure and income position indicated for maximum credit use were selected in both instances (Tables 18 and 19). It was felt that these two bench-mark farms would adequately reflect the income level that might be expected for each size of farm, under a program of intensification credit. It then became necessary to establish for each bench-mark farm, what the required level of operator equity would need to be at a specific age level, in order that $30,000 could be accumulated at the end of age 45. For purposes of the analysis, each bench-mark farm was considered to be at a constant optimum resource use level through all stages of operator equity.

The rate of capital accumulation or debt repayment at a given level of net income is entirely dependent on the portion of net income that must

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2/ The original assumption used in setting up the requirements of the proposed credit program was that those farmers with equities over $20,000 would be eligible for conventional credit, and thus not be eligible for inclusion in the program. In the current instance, however, it was assumed that because of the time required to accumulate added capital, the farmer would be at an age where a higher equity would likely be required in order to qualify for conventional credit.

3/ It was assumed that where the added investment took place within the farm, the returns from this would be plowed back into additional investment so that the family living standard would remain constant during this period of capital accumulation.

be used for family living. In order to gauge the effectiveness of intensification credit as a means of building up owned assets, it was elected to use four levels of family living standard. The levels selected were $1200 per year, $1600 per year, $2000 per year and $2400 per year. The net farm income levels outlined in Table 19 for each bench-mark farm were then used to arrive at a residual for debt repayment and capital accumulation under the four levels assumed for family living standards. A separate analysis was carried out with each farm to determine how much additional capital accumulation was needed; and what level of operator equity was required in order that the residual for debt repayment and capital accumulation would allow attainment of $30,000 owned equity be age 45.

1. Low Equity Bench-mark Farm:

Linear programming under unlimited intensification credit indicated that the resource base of the low equity farm would be capable of producing an average of $2,892 net farm income per year, under conditions of optimum resource allocation. In order to earn this level of net farm income, a total of $22,310 was indicated as the required level of investment and working capital. Assuming minimum owned equity requirements of $30,000 by age 45, the operator of this scale of farm would be required to accumulate an additional $7,690 ($30,000 - $22,310) in addition to paying off whatever money was borrowed to establish the $22,310 fund required for this farm. The residual for debt repayment and capital accumulation under each level of family living standard is given as follows:

Net Farm Income	$2,892	$2,892	$2,892	$2,892
Level of Family Living Standard	$1,200	$1,600	$2,000	$2,400
Residual for Debt Repayment and Capital Accumulation	$1,692	$1,292	$ 892	$ 492

Using the residual for debt repayment and capital accumulation indicated for each level of family living standard, a table was established to determine at each age level, what the required level of annual capital accumulation (at 6 percent compound interest) would be in order to accumulate the $7,690 required to make up the $30,000 equity level. This level of annual capital accumulation was then deducted from the residual for debt repayment and capital accumulation to give an annual figure for debt repayment. Using amortization tables, the size of debt load that could be handled at 6% interest was calculated for each level of annual debt repayment capacity, assuming the debt to be repaid by age 45. This debt load was then expressed as a percent of the capital requirements of the farm unit ($22,310) to indicate the required level of operator equity at each level of family living standards and for each operator age group. These data are recorded on Table 21.

Figure 1 outlines graphically the relationship between the age of operator and the required level of operator equity as a percent of total capital, for the four selected levels of family living standards. It can be readily observed from a survey of Table 21 and Figure 1, that a very substantial equity in the farm is required by even a young farmer, when desiring to accumulate $30,000 by age 45, while enjoying a minimum family living standard of $2,400 per year. At age 20, for instance, the beginning farmer wishing a $2,400 family living standard would have to own 79.8 percent or $17,813 of the required $22,310 total capital if he planned to repay the balance, plus accumulate $7,690 by the age of 45. On the other hand, if he were willing to accept a $1,200 family living standard during the repayment interval of the loan, he would need an equity of only $2,473

Table 21

Required Level of Operator Equity, Basis Age of Operator and Residual for Debt Repayment and Capital Accumulation, Low Equity, Bench-Mark Farm

Age of Operator	Repayment Period Available - Years	Residual for Capital Accum. and debt Repayment	Annual Savings Req'd to Accumulate $7,690 @ 6% by Age 45	Residual for Debt Repayment	Debt Load that can be Handled - 6% Interest	Required Level of Operator Equity - as % of $22,310
		$	$	$	$	
1. Basis $1,200 Family Living:						
20	25	1,692	140.18	1551.82	19,837	11.1%
24	21	"	192.31	1499.69	17,642	20.9%
28	17	"	272.61	1419.39	14,871	33.8%
32	13	"	407.32	1284.68	11,373	49.0%
36	9	"	669.29	1022.71	6,956	68.8%
40	5	"	1364.35	327.65	1,380	93.8%
2. Basis $1,600 Family Living:						
20	25	1,292	140.18	1151.82	14,724	34.0%
24	21	"	192.31	1099.69	12,937	42.0%
28	17	"	272.61	1019.39	10,680	52.1%
32	13	"	407.32	884.68	7,832	64.9%
36	9	"	669.29	622.71	4,235	81.0%
3. Basis $2,000 Family Living:						
20	25	892	140.18	751.82	9,611	56.9%
24	21	"	192.31	699.69	8,231	63.1%
28	17	"	272.61	619.39	6,489	70.9%
32	13	"	407.32	484.68	4,291	80.8%
36	9	"	669.29	222.71	1,515	93.2%
4. Basis $2,400 Family Living:						
20	25	492	140.18	351.82	4,497	79.8%
24	21	"	192.31	299.69	3,526	84.2%
28	17	"	272.61	219.39	2,299	89.7%
32	13	"	407.32	84.68	750	96.6%

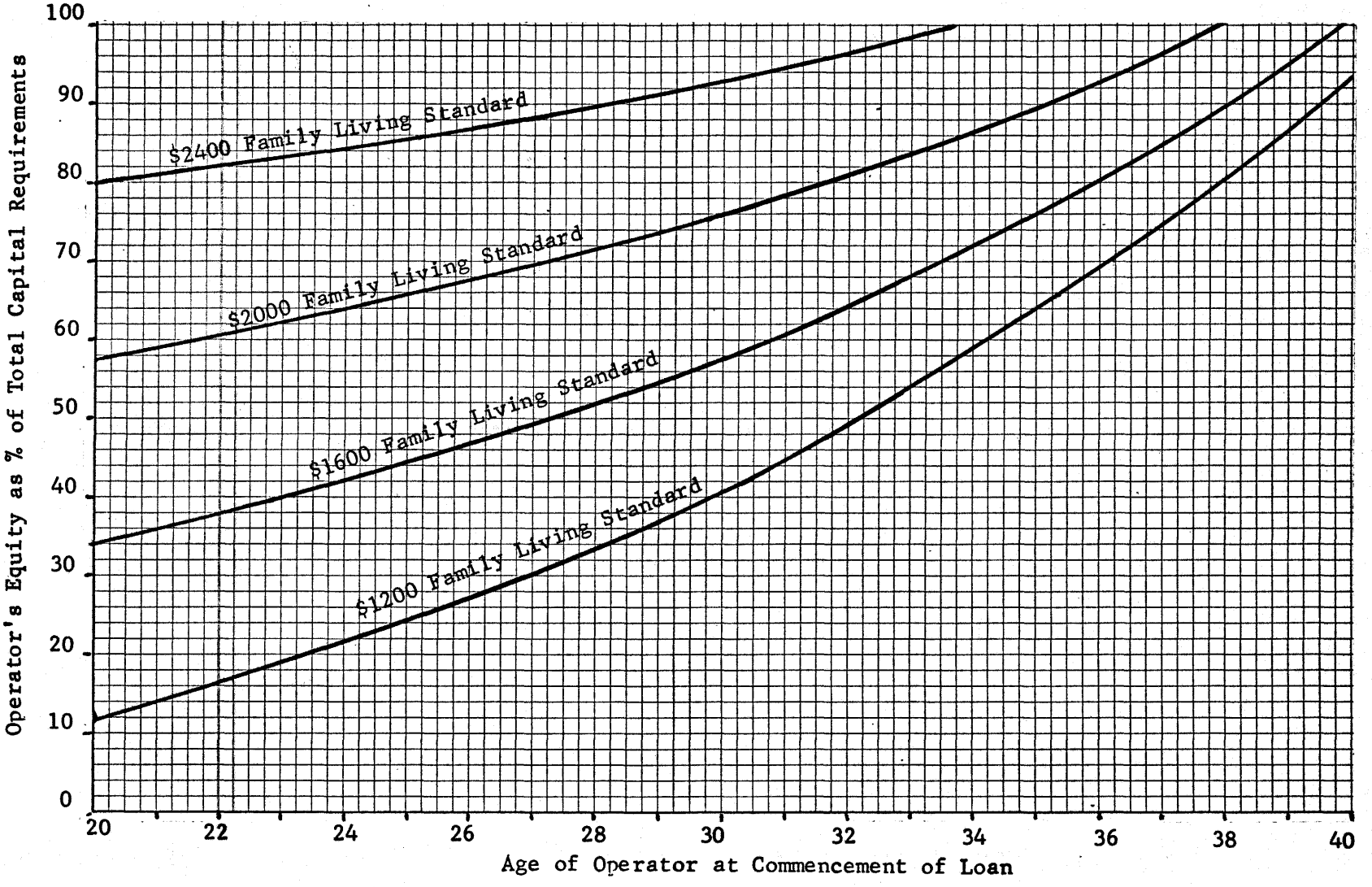

Figure 1 - Relationship of Operator Age and Required Equity Level as Percent of Total Farm Capital, in Order to Accumulate $30,000 Net Assets by Age Forty-Five, Basis Specified Levels of Family Living Standards; Low Equity Bench-mark Farm, Optimum Resource Use.

in order to pay off the total capital requirements by age 45, in addition to accumulating $7,690 additional capital over this period of time.

2. High Equity Bench-Mark Farm:

The resource base available for production in the high equity bench-mark farm, indicated a potential net farm income of $4,738 from the use of intensification credit programmed for optimum resource use. A total capital investment (working capital and investment capital) of $30,990 was indicated under the optimum combination of resources and enterprises assumed available for this farm. Under this situation, an operator would have to repay only 96.8 percent of the total capital requirements by age 45 in order to have the necessary $30,000 net assets. Accordingly, it was not necessary in this instance to allow for accumulation of additional capital over and above the value of the farm capital. Any surplus net farm income over and above that required for family living could therefore be directed entirely to repayment of farm debt.

As with the low equity bench-mark farm, the same four levels of family living standards were established for purposes of calculating the residual for debt repayment. This residual for debt repayment at each level of family living standard is given as follows:

Net Farm Income	$4,738	$4,738	$4,738	$4,738
Desired Level of Family Living Standard	$1,200	$1,600	$2,000	$2,400
Residual for Debt Repayment	$3,538	$3,138	$2,738	$2,338

The residual income for debt repayment was used to establish the debt load that could be handled at 6 percent interest over specified repayment periods (ending at age 45). The data on potential debt load was subsequently used to calculate the required level of operator equity, if the necessary

$30,000 net assets were to be accumulated by age 45 (Table 22).

Table 22

Required Level of Operator Equity, Basis Age of Operator and Residual for Debt Repayment, High Equity Bench-Mark Farm

Age of Operator	Repayment Period Available - Years	Residual for Debt Repayment	Debt Load that can be Handled - 6% Interest	Required Level of Operator Equity - as % of $30,990
		$	$	
1. Basis $1,200 Family Living:				
32	13	3,538	31,321	0%
34	11	"	27,904	10.0%
36	9	"	24,064	22.4%
38	7	"	19,751	36.3%
40	5	"	14,903	51.9%
42	3	"	9,457	69.5%
2. Basis $1,600 Family Living:				
30	15	3,138	30,477	1.7%
32	13	"	27,780	10.4%
34	11	"	24,749	20.1%
36	9	"	21,344	31.1%
38	7	"	17,518	43.5%
40	5	"	13,219	57.4%
42	3	"	8,388	72.9%
3. Basis $2,000 Family Living:				
26	19	2,738	30,551	1.4%
30	15	"	26,592	14.2%
34	11	"	21,594	30.3%
38	7	"	15,285	50.7%
42	3	"	7,319	76.4%
4. Basis $2,400 Family Living:				
22	23	2,338	28,766	7.2%
26	19	"	26,088	15.8%
30	15	"	22,707	26.7%
34	11	"	18,440	40.5%
38	7	"	13,052	57.9%
42	3	"	6,249	79.8%

The data in Table 22 are outlined graphically in Figure 2, where the relationship between age of operator and required level of operator equity is established at the four levels of family living standards. A study of this chart and the data contained in Table 22 indicates that a young farmer starting with a farm unit of this magnitude has a much lower equity requirement than would be the case for the low equity bench-mark farm. Even at a living standard of $2,400 per year, the beginning farmer at age 24 would be able to accumulate $30,000 by age 45, with only an initial equity of 11.2 percent ($3,486) of total capital requirements. This compares to 84.2 percent ($18,784) for the 24 year old farmer on the low equity bench-mark farm, who wishes to accumulate $30,000 net assets by age 45 and still enjoy a $2,400 family living standard during the repayment period. As the acceptable standard of family living is lowered, the relative contrast in equity requirements between the two farm sizes becomes considerably less significant. The 24 year old farmer wishing to accumulate $30,000 by age 45 on the high equity bench-mark farm would need no equity in the farm, if electing to accept a $1,200 family living standard per year. This compares to a required equity of 20.9 percent ($4,668) for the equivalent situation on the low equity bench-mark farm.

5.2 Analysis Procedures and Results Regarding the Validity of Operational Procedures Assumed for the Proposed Credit Program

In setting up the framework for a program of supervised intensification credit, it was hypothesized that two distinct credit programs were needed. In setting out the requirements of each program, a number of basic assumptions were made concerning the operational aspects of the programs. These basic assumptions were then regrouped into several related areas to be tested as hypotheses in themselves. An analysis was made, and conclusions reached, concerning the following assumptions:

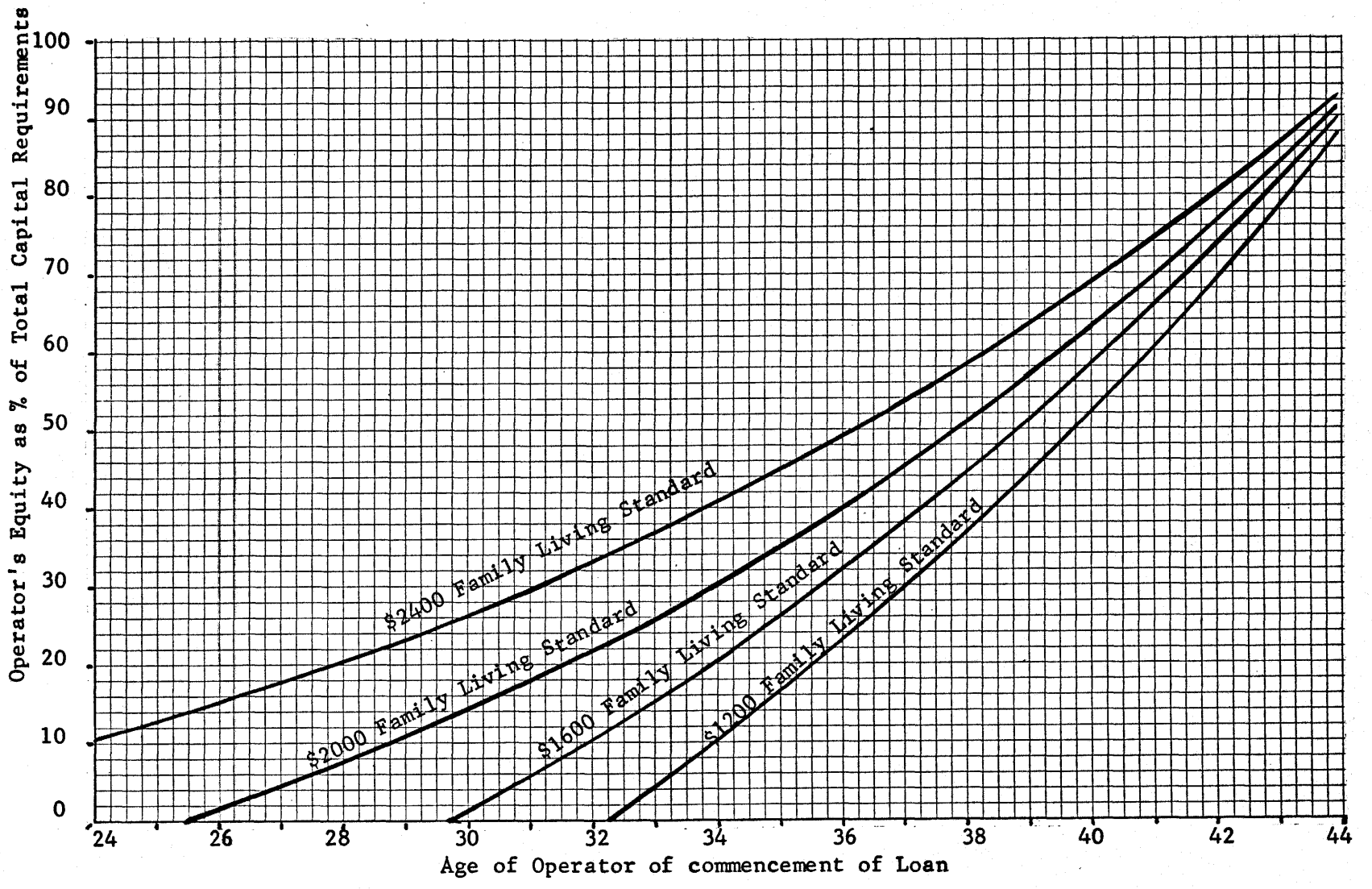

Figure 2 - Relationship of Operator Age and Required Equity Level as Percent of Total Farm Capital, in Order to Accumulate $30,000 Net Assets by Age Forty-Five, Basis Specified level of Family Living Standard; High Equity Bench-mark Farm, Optimum Resource Use.

1. That two specific credit programs are necessary, depending on whether the objective is to maximize family living standards for those farmers too old, and with too little equity to take advantage of conventional credit (the short-term credit program); or whether the objective is to raise net farm income as a prerequisite to the use of conventional credit at a future date (the long-term credit program).

2. That the size of loan for both the short-term and the long-term adjustment program must be based on the operator's equity and time available for repayment; more specifically, that the operator's equity must be a minimum of 40 percent of the total capital after the loan is made, plus 2 percent for every year the farmer exceeds age 45; and that the maximum term of a loan under the credit program be limited to 20 years for the long-term program and 10 years for the short-term program. All loans were considered to be terminated at age 65.

3. That an interest rate of 6 percent is feasible in both the long and short-term credit program.

4. That there is a need for a revolving loan fund to provide flexibility of loan repayment, and to meet operating costs during years of low income.

5. That all security for loans under both parts of the intensification credit program be based on the complete farm unit in the form of a "package" loan.

Considerable use was made in this phase of the analysis, of the bench-mark farm data developed by linear programming with respect to the low and high equity bench-mark farms. This data base was further supplemented by two additional linear programs applied to the average equity bench-mark farm.

All bench-mark data used in this section pertained to the optimum farm resource organization as indicated from the use of intensification credit in all three bench-mark farms.

5.2.1 Analysis of the Need for Both a Short-Term and a Long-Term Credit Program

Intensification credit use, it was assumed, could lead to a situation of either maximum net farm income or a maximum family living standard, depending on the objective. The type of credit program designed to maximize family living standards, it was hypothesized, would have different lending purposes than where maximum net farm income was desired. This basic difference of uses to which credit should be put, depending on the intent, was considered to be a key factor in setting up a credit program that would permit improved living standards for the older farmer; or alternatively, allow for increased net farm income as a means of hastening progress of the younger farmer towards conventional credit and an economic farm unit.

Where the objective of the intensification credit program was increased family living standards, it was assumed that credit use should be restricted to uses requiring as little as possible capital accumulation; that is, for uses which would be quickly returned in the gross income stream, and which would involve a fairly high degree of annual depreciation. These uses were defined as the purchase of machinery and equipment, the purchase of livestock, the repair and renovation to farm buildings, and the provision of cash operating inputs. Loans for permanent improvements to land were excluded because of the high capital accumulation involved with such loans. Building construction was further excluded, partly because of the low annual

depreciation(and hence high capital accumulation required in the space of a few years) and partly because it was felt that no loans should be made which might be lost upon consolidation of the farm unit by another farm at some time in the future. Credit for the long-term adjustment program, on the other hand, was considered to be available for all intensification purposes.

The average equity bench-mark farm was selected as the basis for testing the assumed requirements of loans under both the short-term and the long-term credit program. In order to test out the hypothesis of alternative loan uses, depending on the purpose of the credit program, two linear programming models were developed and used. The first of these models involved programming for resource use giving maximum net farm income. This model was also used in establishing the optimum resource use pattern for both the low and high equity bench-mark farms. After programming the average equity bench-mark farm for maximum net farm income, the programming model was then modified to allow selection of the optimum resource use pattern required to maximize family living standards. The modifications consisted of adding back annual depreciation reserves applicable to each enterprise, and activating a credit repayment activity on the basis of a 10 year loan. This latter modification required that before any money could be borrowed, its marginal rate of return would be equal to the 6 percent interest charge plus the remaining amortized portion of the principal borrowed. On the basis of a 10 year loan, credit could be borrowed only to the point where the marginal returns equalled 13.59 percent. At this rate of return, the annual amortized repayment of 13.59 cents per dollar borrowed (10 year term) could be met.

Allowing annual depreciation reserves to be added back to each activity modified the enterprise selection by causing the linear program to give greater emphasis to those credit uses involving substantial depreciation. With this modification, and with the addition of a credit repayment activity, the linear programming model was then used to establish the resource use pattern needed in order that the family living standard be maximized for the average equity bench-mark farm. The resource use pattern, net farm income, and family living standards during the assumed repayment period of 10 years were then compared for both program results. This is outlined in Table 23 and Table 24.

Programming for maximum family living standards during the repayment period resulted in a decrease of $174 net farm income over what had been obtained on the basis of programming for maximum net farm income. As outlined in Table 23, gross income decreased by $401, while cash operating expenses and depreciation decreased by $206 and $21 respectively, when programming for maximum family living instead of maximum net income. When the family living standard was compared for both programs, however, the program designed to maximize family living standards resulted in a higher standard of family living during the repayment period, despite the lower level of net farm income. This is indicated in Table 24.

As indicated in Table 24, the family living standards differed by only $15 between the two programs, when considering a 20 year repayment period. A farm programmed for maximum family living standard would give approximately the same level of living during a 20 year repayment period, but would accumulate less assets because of the lower net farm income position. On the basis of a 10 year repayment period, an increase of $72

Table 23

Comparison of Income and Expenses, Under Alternative Linear Programming Models Designed to Give Maximum Net Farm Income and Maximum Family Living Standards, Average Equity Bench-Mark Farm

Item	Orientation of Linear Programming Model: Maximum Net Farm Income	Maximum Family Living Standard
	$	$
1. Gross Income:		
Crops	3,574	3,890
Livestock	5,642	4,925
Total Gross Income	9,216	8,815
2. Costs of Production (less Labor):		
(a) Cash Operating:		
Crops	1,455	1,515
Livestock	2,671	2,405
General Overhead	382	382
Total Cash Operating	4,508	4,302
(b) Depreciation:		
Buildings & improvements	223	202
Machinery & equipment	340	340
Total Depreciation	563	542
(c) Investment:		
Av. Inventory @ 5%	1,165	1,084
3. Income Summary:		
Gross Income	9,216	8,815
Less Cash Operating	4,508	4,302
= Returns Over Cash Operating	4,708	4,513
Less Depreciation	563	542
= Net Farm Income	4,145	3,971
Less Investment Cost	1,165	1,084
= Operator & Family Labor Returns	2,980	2,887

Table 24

Comparison of Family Living Standards During Repayment Period, Under Alternative Linear Programming Models Designed to Give Maximum Net Farm Income and Maximum Family Living Standards, Average Equity Bench-Mark Farm

	Item	Orientation of Linear Programming Model: Maximum Net Farm Income	Orientation of Linear Programming Model: Maximum Family Living Standard
		$	$
	Credit Used	11,065	9,248
1.	Family Living Standard - 20 year Loan:		
	Net Farm Income	4,145	3,971
	Less Annual Amortized Payment @ 6%	965	806
	= Family Living Standard	3,180	3,165
2.	Family Living Standard - 10 year Loan:		
	Net Farm Income	4,145	3,971
	Less Annual Amortized Payment @ 6%	1,503	1,257
	= Family Living Standard	2,642	2,714
3.	Family Living Standard - 5 year Loan:		
	Net Farm Income	4,145	3,971
	Less Annual Amortized Payment @ 6%	2,627	2,195
	= Family Living Standard	1,518	1,776

per year was found to exist in favor of the model programmed for maximum family living standard. This increase in family living standard during the debt repayment period rose to $258 per year when a 5 year repayment period

was considered.

Although the linear programming model designed to maximize family living standards did allow a somewhat higher level of family living during the 10 year repayment period assumed in the program, the increase of $72 per year (2.7 percent) could not be considered as very substantial. Since this programming model was designed to place more emphasis on the use of credit for depreciable assets, however, the programs were then compared on the basis of what might be considered a short-term family living standard. In this comparison, depreciation reserves were added back to the available family living standard to give an income level that could be used for living purposes, provided the borrower would be retiring at the end of the loan. The borrower would thus not be required to replace any depreciable assets. This was primarily the situation considered most applicable to the older farmer having perhaps 10 years left to farm.

	Programming For Maximum Net Farm Income	Programming For Maximum Family Living Standard
	$	$
Family Living Standard - 10 year Loan	2,642	2,714
Annual Depreciation Reserves	563	542
= Short Term Family Living Standard	3,205	3,256

Adding back depreciation reserves gave a substantially higher level of family living for both programming models. The difference in favor of the program designed to maximize family living standards, however, decreased by $21 over what had been the situation prior to adding back depreciation reserves.

It had been assumed that in order to maximize family living standards during the repayment period of a loan, credit uses involving considerable capital accumulation should be eliminated. When programming to maximize family living standards, however, all credit uses assigned to intensification credit were retained in the program to see if, in fact, loans involving capital accumulation were actually minimized. Table 25 outlines the farm resource structure and land use pattern which appeared in each program.

For the most part, the land use and resource structure for both programs followed the same general pattern. Somewhat less clearing and breaking was done ($435) when programming for maximum family living standard, but the relative difference amounted to only 17.1 percent less than within the program designed to give maximize net farm income. Relatively smaller purchases of buildings and livestock (depreciable items) appeared in the model stressing family living standards. A somewhat higher seeded acreage resulted when programming on the basis of family living standards. This increase was more than offset by the decrease in acreage seeded to tame grass.

No significant difference appeared to exist in the uses to which credit was applied as between the two programs. Credit use took place on the basis of the most profitable marginal returns, and stopped at the point where the cost of credit was equal to the marginal returns from its use. When programming for maximum family living standards, this point took place where the marginal return from additional capital use equalled the combined interest and principal payment per dollar borrowed on the basis of a 10 year loan. The marginal value product for both owned investment capital and owned working capital stood at $.1359.[4/] This indicated that an

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4/ See Appendix I for complete list of marginal value products.

Table 25

Comparison of Farm Resource Structure and Land Use Under Alternative Linear Programming Models Designed To Give Maximum Net Farm Income and Maximum Family Living Standards, Average Equity Bench-Mark Farm

Item	Orientation of Linear Programming Model: Maximum Net Farm Income	Orientation of Linear Programming Model: Maximum Family Living Standard
	$	$
1. Credit Used	11,065	9,248
2. Investment Relationships:		
Land	9,627	9,192
Buildings & improvements	4,468	4,031
Machinery & equipment	3,444	3,444
Livestock and poultry	5,756	5,023
Total Inventory Capital	23,295	21,690
Working Capital Used in Program	4,344	4,132
Sub-Total	27,639	25,822
Adjustment to Working Capital a/	141	177
Total Capital Requirements	27,780	25,999
3. Land Use:		
Seeded Acreage:		
Wheat	82.3	96.41
Oats	14.59	10.43
Barley	42.89	39.58
Total Seeded Acres	139.78	146.42
Summerfallow Acreage	96.89	106.84
Total Crop Acres	236.67	253.26
Tame Grass Acreage	72.33	55.74
Total Cultivated Acres	309.00	309.00
Native Land	129.00	129.00
Total Acres	438.0	438.0

a/ Working capital requirements indicated in each linear program were adjusted to include operating capital considered fixed for purposes of programming, and to exclude depreciation charges on machinery and building purchases required during the course of the programming.

additional supply of credit could not be used since the required payment of interest and principal per dollar borrowed also came to $.1359.

5.2.2 Analysis of the Relationship Existing Between Size of Loan, Term of Loan, and Operator's Equity

A blanket assumption was made that for both the short-term and the long-term credit programs, the extent of available credit would best be determined by the size of the operator's equity and the available period for repayment. It was considered that the size of loan, operator equity and repayment period must be considered jointly in order to maintain a minimum standard of family living during the repayment period. In order to test the specific assumptions made, the low and high equity bench-mark farms were chosen as the basis for this phase of the analysis. A separate analysis was made for each bench-mark farm as to the relationship between size of loan, term of loan and operator equity.

Within each bench-mark farm, four levels of family living standards were selected in order to establish the residual for debt repayment at each level. These levels were $1,200, $1,600, $2,000 and $2,400 per year. The residual available for debt repayment at each level was then used to calculate the debt load that could be handled at six percent interest, on the basis of several selected repayment intervals. From the resulting debt load calculations, the required level of operator's equity at alternative repayment terms was established on the basis of total capital requirements indicated for each bench-mark farm.

1. The Low Equity Bench-mark Farm:

Total capital requirements, including working capital, were calculated to be $22,310 for the low equity bench-mark farm (Table 18). At

this level of capital investment, an annual net farm income of $2,892 was indicated (Table 19). Calculation of the residual for debt repayment at each level of family living is as follows:

Net Farm Income	$2,892	$2,892	$2,892	$2,892
Specified Level of Family Living	$1,200	$1,600	$2,000	$2,400
Residual for Debt Repayment	$1,692	$1,292	$ 892	$ 492

At each level of family living, the residual for debt repayment was used to establish the debt load that could be handled at six percent interest over a series of repayment periods. These data are presented in Table 26.

As might be expected, the required level of operator equity as a percent of total capital rose significantly as the level of family living standard during the repayment period was extended from $1,200 per year to $2,400 per year. The more precise nature of this relationship can be established from the graphical presentation of this data as contained in Figure 3.

A comparison of the assumptions made with respect to size of loans, operator equity and repayment terms for the low equity bench-mark farm indicated that these assumptions, if applied, would ensure a family living standard of approximately $1,600 during the repayment period of the loan. In the case of both the long-term and the short-term lending program, for instance, it was assumed that the maximum term of the loan should be restricted to 20 years and 10 years respectively, with the provision that the operator's loan be held to a minimum of 40 percent of total capital after the loan is made, plus 2 percent for each year the farmer exceeds age 45. With a full 20 years to repay in the case of a long-term loan, the 40 percent equity requirement compares closely to the 33.6 percent level indicated

Table 26

Relationship Between Operator Equity, Term of Loan, and Size of Loan, at Selected Levels of Family Living Standards, Low Equity Bench-Mark Farm

	Repayment Period Available	Residual For Debt Repayment	Debt Load That Can Be Handled @ 6%	Required Level of Operator Equity Basis $22,310 Total Capital
	Years	$	$	
1. Basis $1,200 Family Living Standard:	4	1,692	5,863	73.7%
	8	"	10,507	52.9%
	12	"	14,185	36.4%
	16	"	17,099	23.4%
	20	"	19,407	13.0%
2. Basis $1,600 Family Living Standard:	4	1,292	4,477	79.9%
	8	"	8,023	64.0%
	12	"	10,832	51.4%
	16	"	13,057	41.5%
	20	"	14,819	33.6%
3. Basis $2,000 Family Living Standard:	4	892	3,091	86.2%
	8	"	5,539	75.2%
	12	"	7,478	66.5%
	16	"	9,014	59.6%
	20	"	10,231	54.2%
4. Basis $2,400 Family Living Standard:	4	492	1,705	92.4%
	8	"	3,055	86.3%
	12	"	4,125	81.5%
	16	"	4,972	77.7%
	20	"	5,643	74.7%

as necessary to maintain a $1,600 family living standard (Figure 3). Assuming the time for repayment to be reduced to 10 years (at age 55), the farmer would be required to have a basic 40 percent equity plus an additional 20 percent (10 years at 2 percent each year) to cover the restricted time for repayment resulting from advanced age. This 60 percent equity level assumed to be necessary compares favorably to the 57.4 percent indicated in Figure 3 at the $1,600 family living standard. At age 61, an operator equity of 72 percent was assumed (40 percent basic plus 2 percent times 16 years). Figure 3 indicates that at the $1,600 level of family living standard, a 79.9 percent operator equity is actually required for the low equity bench-mark farm.

2. The High Equity Bench-mark Farm:

The high equity bench-mark farm as indicated in Table 18 had a total capital requirement (including working capital) of $30,990. Annual net farm income possible with this scale of investment was found to be $4,738 per year (Table 19). Using the four levels of family living standard assumed in the low equity bench-mark farm, the residual for debt repayment was calculated for each level:

Net Farm Income	$4,738	$4,738	$4,738	$4,738
Specified Level of Family Living	$1,200	$1,600	$2,000	$2,400
Residual for Debt Repayment	$3,538	$3,138	$2,738	$2,338

The residual for debt repayment at each level of family living was used to establish the debt load that could be handled, at six percent interest, over a series of repayment periods. This information is presented in Table 27.

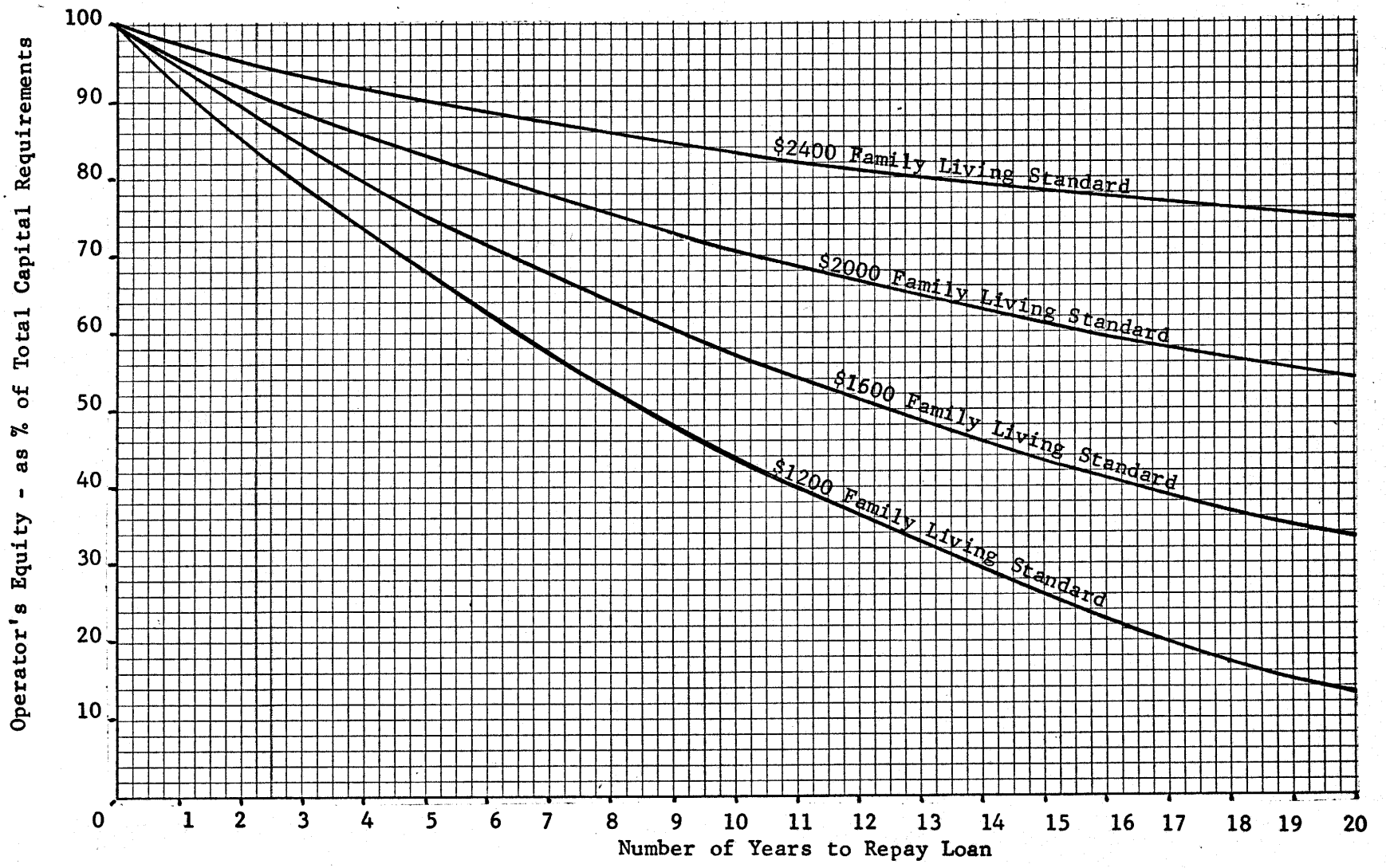

Figure 3 - Relationship of Operator Equity (as % of Total Capital) and Repayment Period, at Selected Levels of Family Living Standard; Low Equity Bench-mark Farm.

The results of Table 27 are presented graphically in Figure 4. As indicated by Figure 4, the assumed relationship between operator equity and term of loan provided for a much higher standard of family living than did the same assumptions in the case of the low equity bench-mark farm. Even at the $2,400 family living standard, for instance, a 20 year loan required only a 13.5 percent operator equity as compared to the basic assumption of 40 percent. Similarly, where age of the operator restricts the loan to a 10 year period, the maintenance of a $2,400 family living standard per year required only a 44.5 percent operator equity as compared to the 60 percent assumed necessary (40 percent basic plus 2 percent for each of 10 years by which the operator exceeds age 45).

5.2.3 Analysis of the Effect of Alternative Interest Rates on the Income Potential of Supervised Intensification Credit

It was initially assumed in this study that a program of intensification credit could be successfully implemented on the basis of a market rate of interest for borrowed money (6 percent). In order to establish the implications of administering the program under some degree of subsidized interest rates, an analysis was made of the effects resulting from the use of subsidized interest rates of 2 and 4 percent respectively. The low and high equity bench-mark farms were chosen as the basis for this analysis. In each instance, a single family living standard of $1,600 was selected for purposes of establishing the residual for debt repayment, based on the indicated net farm income under optimum credit use.

A preliminary calculation was made to determine the effect on family living standards that would result if the money borrowed for each bench-mark

Table 27

Relationship Between Operator Equity, Term of Loan, and Size of Loan, at Selected Levels of Family Living Standards, High Equity Bench-Mark Farm

Item	Repayment Period Available	Residual For Debt Repayment	Debt Load That Can Be Handled at 6% Interest	Required Level of Operator Equity, Basis $30,990 Total Capital
	Years	$	$	
1. Basis $1,200 Family Living Standard:	4	3,538	12,260	60.4%
	8	"	21,970	29.1%
	12	"	29,662	4.3%
	16	"	35,755	0%
2. Basis $1,600 Family Living Standard:	4	3,138	10,873	64.9%
	8	"	19,486	37.1%
	12	"	26,308	15.1%
	16	"	31,712	0%
3. Basis $2,000 Family Living Standard:	4	2,738	9,487	69.4%
	8	"	17,002	45.1%
	12	"	22,955	25.9%
	16	"	27,670	10.7%
	20	"	31,405	0%
4. Basis $2,400 Family Living Standard:	4	2,338	8,101	73.9%
	8	"	14,519	53.2%
	12	"	19,601	36.8%
	16	"	23,628	23.8%
	20	"	26,817	13.5%

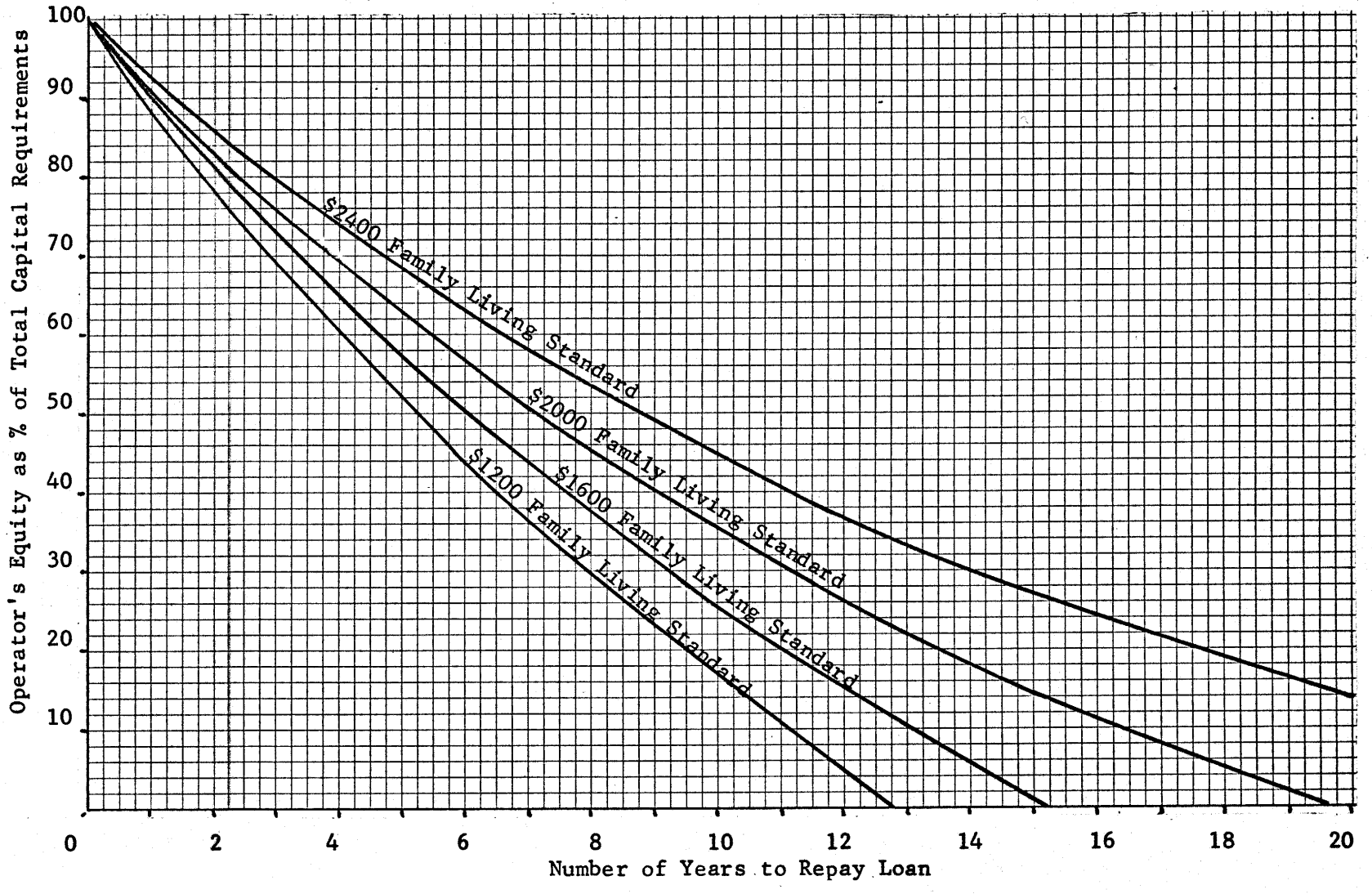

Figure 4 - Relationship of Operator Equity (as % of Total Capital) and Repayment Period, at Selected Levels of Family Living Standard, High Equity Bench-mark Farm.

farm were repaid at 2 and 4 percent interest, as compared to the 6 percent rate actually used in the programming. It should be pointed out that the net farm income and total credit use indicated for both farms was based on the six percent interest rate assumed in the linear programming model. No attempt was made to reprogram each bench-mark farm at the 2 and 4 percent interest level. To this extent, the family living standard after debt repayment reflects only the effect of the interest rates insofar as repaying the credit use indicated for each program. Had the two bench-mark farms been reprogrammed at 2 and 4 percent interest rates, a higher net farm income and a correspondingly higher credit use would have been indicated.

Table 28 outlines the comparison of family living standards under alternative interest rates.

Insofar as residual for family living, the subsidized interest rate of 2 percent enabled a 17.2 percent increase in family living standards for the low equity bench-mark farm during the repayment period of the loan, as compared to that available at the 6 percent interest rate assumed for the credit program. A considerably smaller increase in family living standards (7.6 percent) took place when making the same comparison for the high equity bench-mark farm, even on the basis of slightly less credit. The subsidized interest of 4 percent enabled an increase of 9.0 percent and 4.0 percent respectively in the family income standard, as compared to that available at 6 percent for the low and high equity bench-mark farms.

As a means of establishing the effect of subsidized interest rates on the required level of operator equity and term of loan, a further analysis was made in this respect for both the low and high equity bench-mark farms. A basic family living standard of $1,600 was selected for both bench-mark

Table 28

Comparison of Family Living Standards, Basis Debt Repayment at 2, 4 and 6 Percent Interest, Low and High Equity Bench-mark Farms, Programmed for Optimum Net Farm Income

Item	Size of Bench-mark Farm: Low Equity Bench-mark Farm	Size of Bench-mark Farm: High Equity Bench-mark Farm
	$	$
1. Credit Used a/	12,148	11,026
2. Net Farm Income	2,892	4,738
3. Annual Amortized Debt Repayment Required:		
(a) 20 year loan @ 2%	743	674
(b) 20 year loan @ 4%	894	811
(c) 20 year loan @ 6%	1,059	961
4. Residual for Family Living:		
(a) Basis 20 year loan @ 2%	2,149	4,064
(b) Basis 20 year loan @ 4%	1,998	3,927
(c) Basis 20 year loan @ 6%	1,833	3,777

a/ Credit use indicated is on the basis of 6 percent interest.

farms. The residual for debt repayment was then calculated on the basis of the net farm income reported for each farm. Using this residual figure for debt repayment, a debt load capacity at selected repayment terms was arrived at for each of 2, 4 and 6 percent interest. The debt load capacity at each interest rate and repayment term was then expressed as a percent of total capital requirements in order to establish the required level of operator

equity. These data are presented in Table 29.

Table 29 reveals that introduction of a 2 percent interest rate instead of the 6 percent rate assumed for the credit program, would have the effect of decreasing equity requirements at a specified repayment period, or conversely, decreasing the required repayment period at a constant equity level. As indicated in Figure 5, this effect becomes much more noticeable in both bench-mark farms, when considering an extended repayment term. In the low equity bench-mark farm, for instance, a four percent decrease in interest rates makes it possible for equity requirements to be decreased from 33.6 percent to 5.3 percent at the 20 year repayment term. This difference in equity requirements as between interest rates decreases rapidly as the repayment term is lessened. At the four year repayment term, the difference in equity requirements becomes less than 2 percent.

In the case of the high equity bench-mark farm, the spread in equity requirements as between 2 and 6 percent interest is more pronounced at the 10 year repayment term than that experienced at the low equity bench-mark farm (16.42 percent as compared to 9.40 percent). The spread again trails off rapidly, however, so that at the four year repayment term, the difference is only 3.47 percent.

5.2.4 Analysis of the Need for a Revolving Loan Fund to Provide for Flexibility of Loan Repayment, and to Meet Operating Costs During Low Income Years

One of the most serious obstacles to the satisfactory discharge of an amortized debt, is the variation in net income experienced in Saskatchewan from one year to the next. To some extent, the rigid repayment requirements of an amortized loan can be met in low income years by foregoing

Table 29

Comparison of the Effects of Interest Rate on the Required Level of Operator Equity, Basis Alternative Repayment Intervals, Low and High Equity Bench-Mark Farms

	Repayment Period - Years -	Residual For Debt Repayment @ $1600 Family Living Standard	Debt Loan That Can Be Handled at Alternative Interest Rates			Required Level of Operator Equity as Percent of Total Capital at Alternative Interest Rates		
			2%	4%	6%	2%	4%	6%
1.	Low Equity Bench-Mark Farm: ($22,310 Total Capital)	$	$	$	$	%	%	%
	2	1,292	2,509	2,437	2,369	88.8	89.1	89.4
	4	"	4,920	4,690	4,477	78.0	79.0	79.9
	6	"	7,237	6,773	6,353	67.6	69.6	71.5
	8	"	9,465	8,699	8,023	57.6	61.0	64.0
	10	"	11,605	10,479	9,509	48.0	53.0	57.4
	12	"	13,663	12,126	10,832	38.8	45.6	51.4
	14	"	15,641	13,648	12,009	29.9	38.8	46.2
	16	"	17,542	15,055	13,057	21.4	32.5	41.5
	18	"	19,370	16,356	13,989	13.2	26.7	37.3
	20	"	21,126	17,559	14,819	5.3	21.3	33.6
2.	High Equity Bench-Mark Farm: ($30,990 Total Capital)							
	2	3,138	6,093	5,919	5,753	80.3	80.9	81.4
	4	"	11,949	11,391	10,873	61.4	63.2	64.9
	6	"	17,577	16,450	15,430	43.3	46.9	50.2
	8	"	22,987	21,127	19,486	25.8	31.8	37.1
	10	"	28,187	25,452	23,096	9.0	17.9	25.5
	12	"	33,185	29,450	26,308	0	5.0	15.1
	14	"	37,989	33,147	29,168		0	5.9
	16	"	42,607	36,565	31,712			0

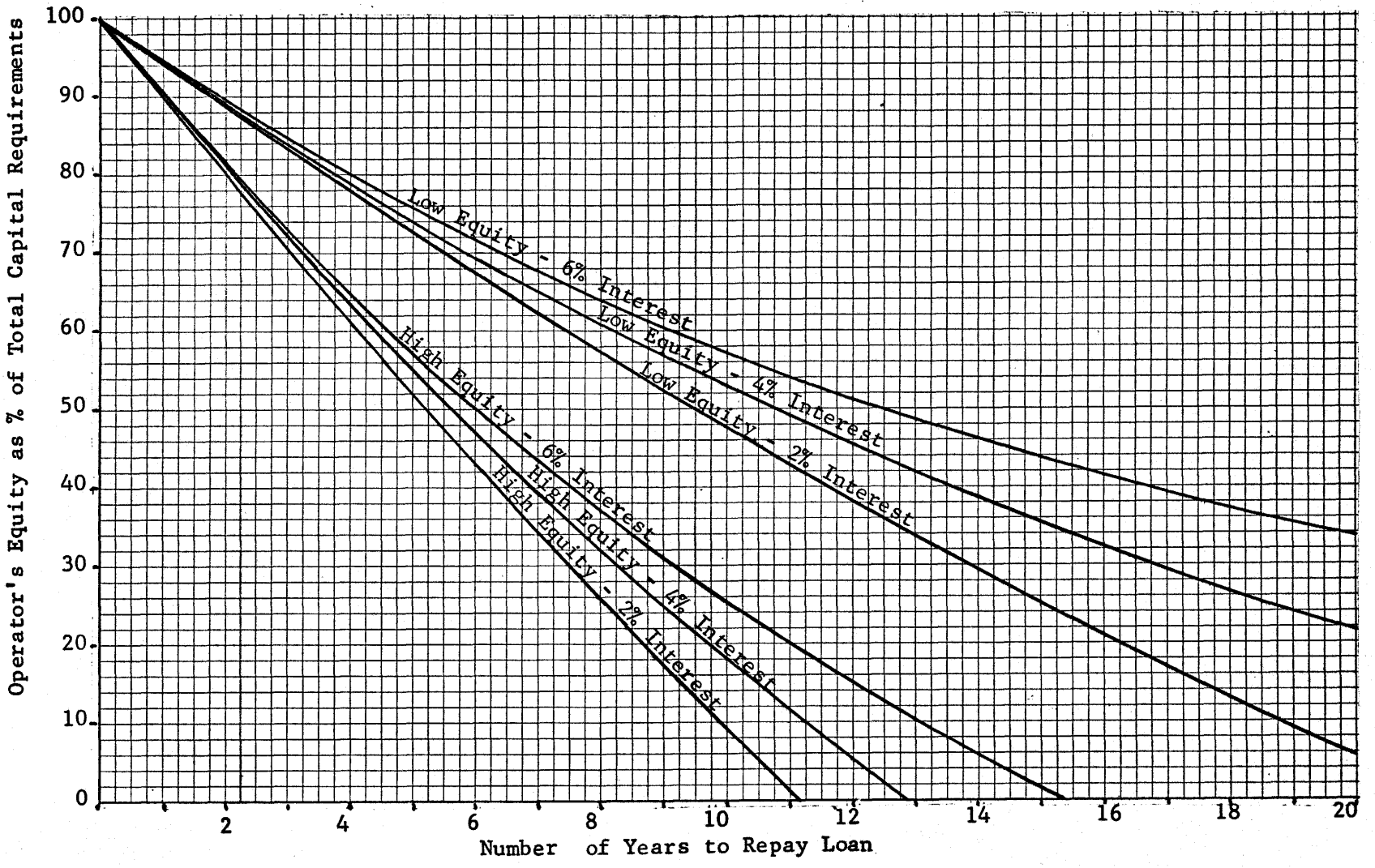

Figure 5 - Effects of Alternative Interest Rates on Required Level of Operator's Equity, at Alternative Repayment Intervals; $1,600 Family Living Standard, Low and High Equity Bench-mark Farms.

depreciation, by selling off productive assets, or by accepting a lower standard of living. Most of the foregoing adjustments, however, may seriously handicap production in a following year. This becomes particularly true where several low income years follow in succession. In order to minimize the impact of low income years on family living standards, and in order to ensure that working capital would be available as needed, it was assumed that a program of intensification credit would be seriously handicapped unless provision was made for a revolving loan fund to be used during years of low income. This study assumed that such a loan fund would be available in any one year to the extent of 20 percent of the original debt. The interest rate on this money was assumed to be 7 percent.

In establishing the extent of need for a revolving loan fund, the low equity bench-mark farm was chosen as the basis for the analysis. It was felt that the need for flexible repayment provisions, if such a need existed, would be most apparent in this size of farm. The actual credit used in the linear program ($12,148) was considered repayable at 6 percent over a 20 year period. This required an annual amortized payment of $1,059.12. It was assumed that during each year, the minimum family living standard required would be $1,800 per year.

In order to duplicate what might be a normal income pattern over the 20 year repayment period, the average wheat yield for the period from 1944 to 1963 was used as the basis for calculating an annual net farm income figure. The average net farm income of $2,892, as reported for the low equity farm, was allowed to vary each year by 90 percent of the variation in the annual wheat yield.[5/] This arbitrary variation assumed changes in

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5/ Information collected in a study of farm management club records for the Black Soil Zone indicated a close correlation between net farm income and the average wheat yield reported each year.

the physical output of livestock as well as grain, due to associated effects of added feed and pasture reserves (as effecting extent of finish and numbers of livestock). Prices were assumed to be held constant, but total costs of production were considered to vary somewhat with the annual production level.

The annual estimates for net farm income (Table 30) were used to establish the need for flexible loan repayments. Each year, a minimum family living allowance of $1,800 was deducted from the net farm income available for that year. This residual for debt repayment was then applied to the repayment required on the original loan ($1,059.12). This enabled calculation of a net position after repayment of the 20 year amortized loan of $1,059.12. In order to establish the degree to which the low equity benchmark farm could adjust to a low income year without the need for additional credit, depreciation reserves were considered available for use as needed, up to the maximum depreciation allowance of $518 per year. After adding back depreciation reserves as needed, an indication could then be had of the need for a revolving credit fund if the minimum family living standard of $1,800 per year was to be maintained. These data are given in Table 31.

Reference to Table 31 indicates that when net farm income over the 20 years of the loan was adjusted to 90 percent of the fluctuations experienced in wheat yields from 1944 to 1963, some part of the depreciation reserves were required to be used up within the year in 6 of the 20 years. In three of the years (years 11, 15, and 18), the maximum depreciation reserve of $518 per year was not sufficient to maintain a minimum family living standard of $1,800 per year. Additional credit was needed for this purpose to the extent of $1,245.12 in year 11, $360.12 in year 15 and $1,401.12 in year 18.

Table 30

Estimated Annual Net Farm Income, Based on Variation in Wheat Yields For Broadview Rural Development Area, Low Equity Bench-Mark Farm

Year	Wheat Yield	Percentage Wheat Yield Deviation from Average	Average Net Farm Income	Percentage a/ Change in Net Farm Inc.	Net Farm Income
	Bushels		$		$
1944	32	+56%	2,892	+50.4%	4,350
45	23	+11%	"	+ 9.9%	3,178
46	21	+ 1%	"	+ 1.0%	2,921
47	23.5	+14%	"	+12.6%	3,256
48	22	+ 6%	"	+ 5.4%	3,048
49	18	-13%	"	-11.7%	2,554
50	18	-13%	"	-11.7%	2,554
51	23.5	+14%	"	+12.6%	3,256
52	29.5	+42%	"	+37.8%	3,985
53	21.5	+ 4%	"	+ 3.6%	2,996
54	6.5	-69%	"	-62.1%	1,096
55	20.5	- 1%	"	- 1.0%	2,863
56	24.5	+18%	"	+16.2%	3,360
57	17	-18%	"	-16.2%	2,424
58	13.5	-35%	"	-31.5%	1,981
59	20.5	- 1%	"	- 1.0%	2,863
60	23	+11%	"	+ 9.9%	3,178
61	5	-75%	"	-67.5%	940
62	21	+ 1%	"	+ 1.0%	2,921
63	30.5	+ 47%	"	+42.3%	4,115
Average	20.7	0%	2,892	0%	2,892

a/ Calculated by taking 90 percent of the wheat yield deviation from the average.

Table 31

Annual Requirements for Revolving Loan Fund in Order to Maintain $1,800 Family Living Standard, and Family Living Standard Available in Absence of Loan Fund, Low Equity Bench-Mark Farm

Year Number	Annual Net Farm Income	Minimum Family Living Standard	Residual for Debt Repayment (+ or -)	Repayment Paid on Original Loan	Net Position After Repay. of Orig. Loan (+ or -)	Depreciation Reserves Deferred as Needed to Max. of $518	Net Annual Requirement for Revolving Loan Fund	Effective Family Living Standard in Absence of Loan Fund
	$	$	$	$	$	$	$	$
1	4,350	1,800	2,550	1,059.12	1,490.88			3,290.88
2	3,178	"	1,378	"	318.88			2,118.88
3	2,921	"	1,121	"	61.88			1,861.88
4	3,256	"	1,456	"	396.88			2,196.88
5	3,048	"	1,248	"	188.88			1,988.88
6	2,554	"	754	"	- 305.12	305.12		1,800.00
7	2,554	"	754	"	- 305.12	305.12		1,800.00
8	3,256	"	1,456	"	396.88			2,196.88
9	3,985	"	2,185	"	1,125.88			2,925.88
10	2,996	"	1,196	"	136.88			1,936.88
11	1,096	"	- 704	"	- 1,763.12	518.00	1,245.12	554.88
12	2,863	"	1,063	"	3.88			1,803.88
13	3,360	"	1,560	"	500.88			2,300.88
14	2,424	"	624	"	- 435.12	435.12		1,800.00
15	1,981	"	181	"	- 878.12	518.00	360.12	1,439.88
16	2,863	"	1,063	"	3.88			1,803.88
17	3,178	"	1,378	"	318.88			2,118.88
18	940	"	- 860	"	- 1,919.12	518.00	1,401.12	398.88
19	2,921	"	1,121	"	61.88			1,861.88
20	4,115	"	2,315	"	1,255.88			3,055.88
Totals	57,839	36,000	21,839	21,182.40	656.60	2,599.36	3,006.36	39,255.96

A final column in Table 31 indicates the actual family living standard that would be experienced if no revolving credit fund was available, and after depreciation reserves for the year had been used to help defray living costs and debt repayment. In the 11th and 18th years, only $554.88 and $398.88 respectively, would have been available for family living.

If the family were able to curtail living standards to the minimum indicated inthe last column of Table 31, and if they increased their living standards to meet the residual available in the higher income years, the end of the 20 year loan period would find need for an additional loan of $2,599.36 to replenish depreciation reserves.

In order to assess the role that a revolving credit fund could play, it was assumed that such a fund did exist. The data in Table 31 were then extended to determine the degree to which the terms of the revolving loan fund could be met. It was assumed that annual depreciation reserves not previously exhausted, could be used to help repay loans taken out from the revolving loan fund. This fund was considered to be repayable within the year, but could be refinanced on a year to year basis as needed. Details of this approach are given in Table 32.

By allowing depreciation reserves to be used in helping to repay the revolving loan fund, the lower one-third equity farm in this example would be able to maintain a minimum family living standard of $1,800 per year and have the revolving loan fund completely repaid at the end of the 20th year. In so doing, however, a total depreciation reserve of $4,383.06 ($2,599.36 deferred before borrowing from revolving loan fund, and $1,783.70 deferred to help repay revolving loan fund) was exhausted during the course of the 20 year period. This means essentially that if the farm operation

Table 32

Effect of Revolving Loan Fund in Maintaining $1,800 Minimum Family Living Standard During Repayment Period of Loan, Low Equity Bench-Mark Farm

Year Number	Net Position After Repayment of Orig. Loan (+ or -)	Depreciation Reserves Deferred as Needed to Maximum of $518	Revolving Loan Account Fund - End of Year Settlement						Family Living Standard Available Through Use of Revolving Loan Fund
			Added Credit Needed For Current Deficit	Interest on Previous Years Outstanding Debt	Loan Balance Before Repayment	Repayment Made During the Year		Outstanding Balance After Repayment	
						From Income	From Deprec.		
	$	$	$	$	$	$	$	$	$
1	1,490.88								3,290.88
2	318.88								2,118.88
3	61.88								1,861.88
4	396.88								2,196.88
5	188.88								1,988.88
6	- 305.12	305.12							1,800.00
7	- 305.12	305.12							1,800.00
8	396.88								2,196.88
9	1,125.88								2,925.88
10	136.88								1,936.88
11	-1,763.12	518.00	1,245.12		1,245.12			1,245.12	1,800.00
12	3.88			87.16	1,332.28	3.88	518.00	810.40	1,800.00
13	500.88			56.73	867.13	500.88	366.25		1,800.00
14	- 435.12	435.12							1,800.00
15	- 878.12	518.00	360.12		360.12			360.12	1,800.00
16	3.88			25.21	385.33	3.88	381.45		1,800.00
17	318.88								2,118.88
18	-1,919.12	518.00	1,401.12		1,401.12			1,401.12	1,800.00
19	61.88			98.08	1,499.20	61.88	518.00	919.32	1,800.00
20	1,255.88			64.35	983.67	983.67			2,072.21

could be continued without replacing normal depreciation on machinery and buildings to the end of the 20th year, an additional loan would be needed at this time to replace this machinery and equipment. The last column of Table 32 indicates, however, that although living standards were not allowed to go below $1,800 per year through action of the revolving loan fund, some years were considerably in excess of $1,800. If the excess of these years ($4,708 in total) were applied to replacement of machinery and buildings during the 20 year period, no additional loan would be needed to replace machinery and buildings.[6/]

5.2.5 Analysis of the Need for Loans Under the Intensification Credit Program to be Based on the Complete Farm Unit (Package Type Loan)

It was assumed that loans secured by the assets purchased would not be feasible in a program of intensification credit designed to help the low-income farmer:

1. Conventional credit secured by the asset purchased, must always be something less than 100 percent of the asset's value in order to safeguard the lender against loan default. The borrower, under such circumstances, must put up cash for the difference. The low-income farmer falling under a program of intensification credit is not likely to have access to the needed cash down payment.

2. When a loan is secured by the asset purchased, the repayment term of the loan is invariably established at considerably less than the productive life of the asset. This is a necessary precaution to ensure that the

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6/ This approach assumes no direct investment of surpluses over and above the basic $1,800 per year. Such an investment would probably take place, however, as the farmer uses the high income years to replace depreciated machinery and buildings.

borrower retains an equity that will be at least equal to the market value of the asset, should the loan be defaulted. Such a provision, however, requires the borrower either to accumulate the value of the asset in a relatively short period of time (and thus accept a low level of family living), or to seek refinancing in order to complete the payments. Where large amounts of credit are needed for such items as working capital, machinery, and livestock, it becomes a physical impossibility for the farmer to accumulate this money in the short time allowed by conventional credit.

In order to spell out the repercussions of securing the loans on the assets purchased, as compared to a package type loan, lending procedures under the Farm Improvement Loans Act were used to compare the two alternative methods of securing a loan. The low and high equity bench-mark farms programmed for maximum net farm income on the basis of $20,000 credit, were selected for this analysis. The actual credit uses under each farm were compared with the repayment and equity requirements outlined under the Farm Improvement Loans Act.

Repayment terms and equity requirements specified under the Farm Improvement Loans Act are given in Table 33.

It was assumed that the low and high equity bench-mark farms would require all the investment capital at the time of borrowing the money. Investment credit used in each linear program for clearing and breaking, buildings and improvements, and livestock, was tabulated for each farm. In so doing, it was considered that the working capital requirements for each farm would be met by liquidating owned machinery and livestock. It was further assumed that the purchase of machinery would also come out of this fund. Using the equity requirements and suggested repayment periods listed for the

Table 33

Loan Limits as Percent of Purchase Price, and Suggested Term of Loan, Farm Improvement Loans Act

	Type of Loan	Term of Loan	Loan as Percent of Purchase Price
1.	Agricultural Implement Loans:		
	New machines	4 Years	66 2/3%
	Used machines	4 Years	60%
2.	Livestock Loans:	a/	75%
3.	Fencing or Drainage:	a/	75%
4.	Construction, Repair or Alteration of Farm Buildings:	a/	90%
5.	Improvement or Development of a Farm:		
	(Clearing and Breaking)	a/	75%

a/ Where no definite term is assigned, the Farm Improvement Loans Act suggests the following repayment schedule as based on size of loan:

$ 1,000 loan - 18 months
$ 2,000 loan - 2.5 years
$ 3,000 loan - 3 years
$ 4,000 loan - 4 years
$ 8,000 loan - 6 years
$12,000 loan - 8 years
$15,000 loan - 10 years

Farm Improvement Loans Act, the actual loan available for each major credit use was calculated, as well as the annual amortized payments required for each loan. These data are presented in Table 34.

When setting up borrowing terms as listed under the Farm Improvement Loans Act, the low equity farm was found to require a down payment of $1,998 in order to borrow sufficient money to meet the capital requirements for clearing and breaking, livestock, and buildings and improvements. A down payment of $2,521 was required by the high equity bench-mark farm. Even with these substantial equity requirements, however, a very high schedule of annual repayments were required during the term of the loans. This is summarized for each farm as follows:

	Year 1 $	Year 2 $	Year 3 $	Year 4 $	Year 5 $	Year 6 $
1. Low Equity Bench-mark Farm:						
Net Farm Income	2,892	2,892	2,892	2,892	2,892	2,892
Less Annual Debt Repayment	1,996	1,996	1,996	829	829	829
= Residual for Family Living	896	896	896	2,063	2,063	2,063
2. High Equity Bench-mark Farm:						
Net Farm Income	4,738	4,738	4,738	4,738	4,738	4,738
Less Annual Debt Repayment	2,451	2,451	2,451	879	879	879
= Residual for Family Living	2,287	2,287	2,287	3,859	3,859	3,859

During the initial three years of the loan, a very limited residual for family living was available to the low equity bench-mark farm, and to a somewhat lesser degree, the high equity bench-mark farm. At the conclusion of six years in both instances, however, the loan payments would cease and the family living standard would revert to the net farm income established for each bench-mark farm. By way of comparison, the assumed program of intensi-

Table 34

Schedule of Annual Payments and Equity Requirements, Basis the Approach Taken by the Farm Improvement Loans Act, By Type and Size of Loan, Low and High Equity Bench-Mark Farms

Bench-mark Farm	Loan Purpose	Value of Capital Required	Equity Required	Loan Available	Annual Loan Repayment Per Year, By Class of Loan - 6% Interest
		$	$	$	$
1. Lower One-Third Equity Farm	(a) Clearing & Breaking	1,756	439	1,317	492.70 for 3 years
	(b) Livestock	5,435	1,359	4,076	828.91 for 6 years
	(c) Buildings & Improvements	2,004	200	1,804	674.89 for 3 years
	Total	9,195	1,998	7,197	1,996.50
2. Upper One-Third Equity Farm	(a) Clearing & Breaking	3,682	920	2,762	1,033.29 for 3 years
	(b) Livestock	5,765	1,441	4,324	879.34 for 6 years
	(c) Buildings & Improvements	1,598	160	1,438	537.97 for 3 years
	Total	11,045	2,521	8,524	2,450.60

fication credit required no operator equity in the asset purchased, provided that sufficient equity existed elsewhere in the farm. A family living standard of $1,833 and $3,777 per year was found to be possible for the low and high equity bench-mark farms, respectively, on the basis of a 20 year repayment term. In effect, the package credit loan enabled a much higher family living standard by allowing for longer credit repayment, regardless of the life expectancy of the items purchased.

CHAPTER VI

CONCLUSIONS

6.1 Effectiveness of the Proposed Credit Program

6.1.1 In Raising Family Living Standards of Low-Income Farmers

Linear programming analysis, directed to representative bench-mark farms (measured by operator's equity) based on those farmers not considered to be eligible for conventional credit, indicated relatively large increases in income through the use of intensification credit. The study disclosed that even when it was assumed that the farmer's production alternatives were limited to the feed and livestock base that could be grown on the farm, a strong margin for added income appeared possible with the use of credit. This was especially true of the high equity bench-mark farm, where the additional land base available to the farmer gave a considerably greater potential for expanded production.

The low equity bench-mark farm approximated a half-section farm, of which less than half of the total acreage was initially under cultivation. It was calculated that without credit, this farm would be capable of earning some $2,930 gross income and $815 net farm income. Even if the operator completely owned the farm, the best that could be expected for family living was some $68 per month. Despite this low return, however, linear programming indicated high potential earnings were possible with the use of credit. Marginal value products calculated for this bench-mark farm revealed that both owned working capital and owned investment capital had a potential marginal return of 43.46 percent. So

critical was the shortage of capital for the low equity bench-mark farm, that no use could be made of the available community pasture privileges, or for that matter, the owned pasture. With the limited amount of owned capital available, the farm operations showing up to be most profitable were a double farrowing hog operation and a grain rotation involving approximately 45 acres of fallow wheat, 16 acres of fallow barley, 16 acres of stubble oats, and 61 acres of summerfallow. Shortage of working capital forced one-half acre of crop land to go idle. No use was made of any native land.

When the low equity bench-mark farm was reprogrammed on the basis of $20,000 available credit (which effectively made capital non-limiting at the interest rate charged), gross income increased by $4,089 (140 percent) and net farm income increased by $2,077 (255 percent). A total of $12,148 credit was required to initiate the improved farm resource use. Provision of this credit fund enabled an additional 46.6 acres to be brought under cultivation. A finished yearling operation (31 cow-calf-yearling operation) replaced the hog enterprise with the result that full use was made of all native pasture, in addition to the supply of community pasture. The marginal value product of owned working and investment capital stood at 6 percent, the cost of borrowing money. Although considerable unused credit existed ($7,852), further intensification was restricted because of the available land base. This restriction was especially binding in that it was assumed that no feedstuffs would be purchased. The marginal value product of cropland stood at $11.12 per acre, indicating high potential returns to additional cropland. Community pasture privileges cost $1.75 per acre (open pasture equivalent),

yet had a marginal value product of $2.05 per acre. Limitations of the land base available to the farm also showed up in the form of high potential returns to additional feed. The marginal value product of native hay was $14.05 per ton, and $17.56 per ton for mixed hay.

Although the use of intensification credit on the low equity bench-mark farm did not enable the type of income that might be thought of as being "economic", a very substantial improvement over the zero credit position was nonetheless brought about. The $12,148 credit utilized in this unit returned an additional net farm income of $2,077 (making a total net farm income of $2,892) for an average return of 17.09 percent per dollar borrowed. Allowing for a 20 year repayment term, the farm family could have enjoyed a living standard of $1,833 per year. Even on the basis of a 10 year loan repayment, over $100 a month would still have been available for family living. At the end of the repayment period, of course, the family living standard would revert to $2,892. These figures, although not in themselves large, did indicate that worthwhile improvements could be brought about in the living standards of the small scale farmer.

The high equity bench-mark farm originally consisted of some 505 total acres, of which 255 acres were under cultivation. This bench-mark farm, falling roughly into the category of a three-quarter section farm, showed a potential gross income of $5,930 without the use of credit. The net farm income level stood at $2,282. Linear programming applied to the bench-mark farm indicated that without access to credit, an optimum farm program consisted of approximately 4 sows on a double-farrowing operation, 8 head of cows for a finished yearling operation, and a cropping

program consisting of about 80 acres of fallow wheat, 25 acres of stubble oats, 25 acres of fallow barley and 105 acres of summerfallow. Although sufficient operator capital existed to ensure use of all crop land, all of the community pasture privileges went unused. A strong potential return to the use of credit was indicated in the marginal value product of owned and working capital - 34.8 percent.

Reprogramming the high equity bench-mark farm with a credit supply fund of $20,000 (in effect, unlimited credit at the interest rate charged) permitted an increase of $4354 in gross income and $2,456 in net farm income. At a total indicated credit use of $11,026, an average net farm income return of 22.3 percent was realized per dollar borrowed. Credit use stopped where the marginal value product equalled the cost of borrowing assumed for the program - 6 percent.

Use of the additional capital in the high equity bench-mark farm resulted in 120 additional acres being added to the original cultivated acreage. The hog operation gave way to an expanded finished yearling program consisting of some 33 cows (cow-calf-yearling). Wheat acreage increased to 116 acres of fallow wheat, followed by approximately 44 acres of stubble barley and 13 acres of stubble oats. An annual acreage of slightly over 72 acres of grass-alfalfa turned up in the program to support the roughage requirements of the finished yearling operation. Community pasture privileges were fully utilized.

An examination of the marginal value products again indicated the high potential returns that would be associated with additional land base. Additional community pasture privileges, for instance, would have yielded $2.89 per acre returns as compared to the assumed charge of $1.75.

Additional crop land would have enabled net returns of $9.61 at the margin. Allowing 40 cents taxes as an overhead cost, and using a capitalization rate of 6 percent, this put the marginal value of an additional crop acre at $153.50. Strong marginal value products were also noted for additional pasture supply ($4.75 per acre) and for both mixed and native hay supply ($16.68 per ton and $15.63 per ton respectively).

On the basis of a 20 year repayment term, the use of intensification credit on the high equity bench-mark farm would have permitted a family living standard of $3,770 per year during the repayment period of the loan. Even at a 10 year repayment term, $3,240 would be available for family living. At the conclusion of the loan, the family living standard could increase to $4,738 (assuming no further expansion in the farm). With a three-quarter section farm of the type indicated by the high equity bench-mark farm, the use of intensification credit to "round" out the unit appeared to have excellent prospects. A potential net farm income of $4,738 for a farm of this scale suggested that not only could a low-income farmer be given the basis for a good living through the use of intensification credit (assuming, of course, that prices remained constant), but he could in fact be elevated to an income level considerably above the provincial average.

The two bench-mark farms used to study the impact of intensification credit on family living standards indicated that for the farm resource structure and operator equity assumed in each instance, substantial

increases (in relative terms) could be had in annual farm income. Linear programming results disclosed that fairly large amounts of intensification credit could be applied to the limited acreage of the small, low-income farm, with prospects for high marginal returns, at least within the limits of the available land base. Considerable clearing and breaking showed up in both bench-mark farms even with investment requirements running as high as $35 per acre (clear and break, arable idle land). Provision of community pastures in the area enabled a considerable expansion of the beef cattle operation with subsequently increased income to the farmer.

The amount of land available to the farm showed up to be a critical factor in determining the extent to which intensification credit could be used in upgrading farm income levels. Even at the one-half section size of a farm, with resources typical to the Broadview area, the scope for intensification credit appeared limited to that of providing a very modest standard of family living, and little else. The addition of an extra one-quarter section, however, enabled a volume of output that raised family living standards to above the provincial average. When assuming that the farmer would rely basically on his own production of feed for livestock, the success of intensification credit appeared closely linked to the available land base. Equally important, it was assumed that management supervision would be available to ensure that all loans were directed to their most productive uses. The importance of this assumption cannot be minimized in that less than optimum resource use could have a fairly major impact on net returns. The results of each linear program were based on minimum management requirements, and to

the extent that these are not practical, the income picture will tend to be distorted.

6.1.2 In Enabling the Younger Farmer to Graduate to Conventional Credit at a Later Date

The younger farmer, it was found, could utilize intensification credit to varying degrees as a means of accumulating the assets needed to qualify for conventional credit. His chances for success in this area were considered to be determined by four factors:

1. His age when commencing to use intensification credit.
2. His equity in the farm business at commencement of the loan.
3. The size of family living standard desired by the farm family during the repayment period of the loan.
4. The land base available on the farm.

Analysis of the low equity bench-mark farm indicated that if the farm family desired a family living standard of $2,400 during the repayment period of the loan, then even a 20 year old farmer would need to have 79.8 percent equity in the farm ($17,813) at the time of taking out the loan, in order that he might accumulate $30,000 by age 45. If this farmer were to expand his operations at age 32 through the use of intensification credit, he would require a 96.6 percent equity in the farm. The success of a program of intensification credit under these circumstances appeared to be extremely limited insofar as providing the background for graduation to conventional credit at a later date.

A different set of circumstances was found to exist if the farm family could get by on an annual family living standard of $1,200 per year. At this level, a 20 year old farmer would need an equity of only

11.1 percent in the farm unit. This would enable him to borrow $19,837 at age 20, and still accumulate $30,000 net assets by age 45. Even at age 32, this farmer would need only a 49 percent equity in the farm unit, and could thus borrow 51 percent or $11,373. He would be able to accumulate the necessary $30,000 net assets by age 45.

Summarizing the position of a farmer on the scale of farm represented by the low equity bench-mark farm, it appeared that he could accumulate the assets needed for conventional credit by age 45, only if he was very young at the time of expanding his production with the use of intensification credit, or if he already had a substantial equity developed in the farm when receiving this assistance at say age 30. In all instances, he would have to be prepared to accept a low standard of living during the repayment period of the loan. By the time the farmer reached age 40, his large equity requirements suggested that only very small amounts of intensification credit could actually be borrowed, and then only if he accepted a bare minimum standard of living during the repayment period.

Analysis of the high equity bench-mark farm (approximately a three-quarter section farm) revealed that intensification credit could play a fairly substantial role in permitting later graduation to conventional credit. Even when electing to maintain a $2,400 annual family living standard, a 22 year old beginning farmer would need only a 7.2 percent initial equity in the final farm unit in order to accumulate $30,000 by age 45. This would amount to $2,224, leaving a total of $28,766 debt which could be carried if credit of this magnitude was available. A farmer electing to expand his operation to this scale of farm at age 34, would need only a 10 percent equity in the final unit, provided he was

willing to accept a $1,200 annual family living standard during the repayment period of the loan.

A farmer possessing a farm unit comparable to the high equity benchmark farm in the Broadview area could be given considerable assistance towards future attainment of conventional credit, by using intensification credit to boost production from his given land base. Even when in his late thirties, a farmer could substitute a lower standard of living for the high equity requirements in order to use intensification credit as a prerequisite to conventional credit. Once the farmer passed the age of 40, however, the degree of assistance that could be provided by intensification credit became very limited, given the cut-off age of 45.

In summary, scale of farm was found to be very critical in establishing the potential of intensification credit as a means of enabling low-income farmers to obtain conventional credit at a future date. Age of the operator, however, also played a vital role in this relationship, with the older operators being virtually ruled out by high equity requirements. In no small part, the level of family living that would be required during the repayment period of the loan determined the potential for success from the use of intensification credit as a means of accumulating the assets needed for conventional credit.

Although the study indicated that intensification credit cannot help all farmers attain the assets needed for conventional credit, this fact does not distract from the value of such a credit program where the objective becomes that of increasing family living standards over a fairly long repayment period. Also, it should be noted that some accumulation of capital will be taking place as the intensification credit is repaid

and this in itself may allow access to some degree of conventional credit at a later date. Another point that must be borne in mind is that rather than looking to intensification credit alone to provide the capital assets needed for conventional credit, attention should be given to the part that can be played by land development and transfer programs. In many instances, intensification credit could serve as a useful adjunct to a program designed to give the smaller farmer control of a greater land base. This dual approach, involving both supervised intensification credit and additional land (community pastures, land purchase credit, leased cultivation land, etc.), could become a powerful tool for agricultural readjustment in the low income areas. The main concern, and it is a serious one, is that such a program should not be allowed to perpetuate the low income problem.

6.2 Appropriateness of Assumptions Made with Regard to Principles Assumed for Implementing a Program of Intensification Credit

6.2.1 The Need for Both a Short-Term and a Long-Term Credit Program

Analysis of the average bench-mark farm under the alternative objectives of programming for maximum net farm income and maximum family living standard, revealed no significant difference as to the lending pattern in each instance. Both programs resulted in the finished yearling livestock operation, with the program leading to maximum net farm income allowing for 32.9 head of cows in the basic herd as compared to 28.7 head for the alternative program. No other livestock operations were indicated in either case. Identical cropping patterns appeared in each

program, although with a somewhat different emphasis. Investment capital called into use in each program was devoted to similar uses - clearing and breaking, purchase of buildings and improvements, and the purchase of livestock and poultry. Programming for maximum family living standard resulted in $1,605 less investment capital than for the alternative program. Working capital employed in both programs varied by only $176 (in favor of the program for maximum net farm income).

Despite the hypothesis made as to the need to have different lending practices to accommodate the objectives of maximum net farm income or maximum family living standard, no difference in resource use appeared when programming for the two objectives. Such differences that did occur were differences of magnitude rather than differences in loan purposes. Because of the requirement that all money was to be repaid in 10 years when programming for maximum family living standard, no credit use was indicated unless the marginal returns were equal to the amortized repayment required per dollar borrowed (13.59 percent). This resulted in less money being advanced for each loan purpose. In the program calling for maximum family living standard, credit for land improvement was 82.8 percent of the equivalent use recorded when programming for maximum net farm income. Building credit was 76.7 percent and livestock credit 87.3 percent of the credit used when the programming objective was maximum net farm income. This suggested that despite the fact that depreciation reserves were added back to income, the program enabling maximum family living standard had one of the least cut-backs in uses involving high capital accumulation (land clearing and breaking), with a considerably larger cut-back in the uses involving depreciation

(buildings and improvements).

A comparison of income levels between the two programs revealed that although net farm income was reduced by $174 when programming for maximum family living standard, the family living standard available during a 10 year repayment term was some $72 per year higher. This was accounted for by the fact that the repayment requirements of a 10 year loan involved a substantial degree of capital accumulation. Where credit was restricted to those uses offering not less than 13.59 percent marginal returns (the amortized payment required per dollar borrowed), the result was a lower over-all loan in proportion to the added income and hence smaller annual amounts of capital accumulation.

Summarizing, no apparent need was found for having two different lending purposes, when considering the alternative goals of maximum net farm income or maximum family living standard. The major criterion to be employed in either instance was that credit be used in its most productive use, regardless of what this use might be. As a further side to this, however, it was concluded that where short-term loans are being extended mainly to improve living standards during the short-run, there is some justification for restricting the over-all amount of credit extended, so that the resulting higher marginal returns would be more nearly in line with the higher degree of capital accumulation required with a short lending period. This would normally be accomplished in linear programming by forcing repayment of borrowed money at an amortized rate based on the available period for repayment.

6.2.2 The Relationship Between Size of Loan, Term of Loan and Operator's Equity

Operator's equity, term of loan and size of family living standard desired during the debt repayment period were found to be critical determinants of the amount of intensification credit that could be borrowed. It was noted that for the low equity bench-mark farm, relatively small loans (10 to 15 percent of total capital) could be borrowed, but only when supported by a 20 year repayment period, and with an annual family living standard of $100 per month during the repayment period of the loan. As the operator desired a greater standard of living, his equity requirements rose in a fairly steep manner. At a $2,400 family living standard during the repayment period of the loan, a borrower was indicated as needing an equity of 74.7 percent ($16,667) in order to borrow $5,643 for repayment within a 20 year period.

Large amounts of credit were found to be possible for the low equity bench-mark farm only if there was a long period left in which to repay the loan, and then, only if the operator would accept a low standard of living during the repayment period of the loan. A farmer having 20 years in which to repay the loan, for instance, and willing to accept a $1,200 family living standard, could borrow $19,407. With an eight year loan, however, this farmer would be able to borrow only $10,507 if he wished to maintain the $1,200 family living standard.

The assumption made with respect to operator's equity requirements (40 percent basic equity after completion of loan plus 2 percent for each year less than the 20 year maximum assumed) was found to hold reasonably close to the actual situation calculated for the low equity bench-mark farm, at

the $1,600 family living standard level. Where loans were for less than eight years, however, this assumption tended to understate the equity requirements. A four year loan, for instance, required a 79.9 percent equity as compared to the assumed requirement of 72 percent. At beyond approximately an eight year loan, the actual equity requirement was established to be somewhat less than that provided in the study assumptions. As an example of this, a 16 year loan required a 41.5 percent operator equity as compared to the assumed equity requirement of 48 percent.

The high equity bench-mark farm was discovered to hold a strong advantage as compared to the low equity bench-mark farm, when comparing allowable loan limits and repayment terms at similar levels of family living standards. At a $1,600 family living standard, for instance, a 16 year loan could be had at zero operator equity. Even on the basis of a 4 year loan, a farmer could borrow up to $10,873 and still maintain a $1,600 family living standard while repaying the loan.

When assessing the appropriateness to the high equity bench-mark farm, of the assumption made with regard to operator equity requirements, it was noted that equity requirements would be greatly overstated, even at the $2,400 family living standard. As a case in point, an operator on a farm of this scale would actually need only a 13.5 percent equity in the final unit for a 20 year loan. This compared to the basic 40 percent equity spelled out in the lending assumptions.

In review, analysis of the relationship between operator equity, size of loan, and term of loan, revealed that as loans decreased to 10 years or less, a rapidly increasing level of operator equity became necessary, if attempting to maintain a minimum standard of family living during the repayment period. Extending loan limits to beyond 15 years enabled proportionately

less reduction in operator equity. The assumptions made as to equity requirements based on term of loan were found to be reasonably satisfactory on the low equity bench-mark farm but considerably out of line for the high equity bench-mark farm. It was concluded in this regard, that a more satisfactory equity requirement provision would be one giving some acknowledgement to the overall level of capital investment.

One note of caution should be injected at this stage. The linear programming model used in this phase of the study was designed to establish the optimum resource use structure needed to give maximum net farm income. No attempt was made, however, to incorporate a transition stage into the model. As a result, the analysis of the relationship between size of loan, term of loan and operator's equity did not make allowance for the transition period needed in order for the bench-mark farms to reach maximum production. For this reason, the relationships shown for the shorter loan repayment periods were felt biased to the extent of the adjustment period needed. This bias was considered to become appreciably less significant as the loan repayment period increased. The actual adjustment period itself, it was concluded, would vary from farm to farm, depending on the extent of physical resource adjustment needed, the time required to make such an adjustment, and the management training required of the farmer.

6.2.3 The Effects of Interest Rates on the Potential for Supervised Intensification Credit

The level of interest rates charged in connection with the use of intensification credit, was found to have a significant impact on the level of family living standards during the loan repayment term. The low equity bench-mark farm for instance, stood to gain $316 per year in the level of family

living standard, basis a $12,148 loan for 20 years at 6 percent as compared to 2 percent. This represented an increase of 17.2 percent. The high equity bench-mark farm, on the other hand, showed a calculated increase of 7.6 percent in family living standards, when repaying the $11,026 loan in 20 years at 2 percent interest instead of the assumed 6 percent rate.

Where a decreased term of loan was in effect, the relative significance of alternative interest rates on family living standards became somewhat more significant. A ten year loan, for instance, showed an increase of 24 percent per year in the family living standard of the low equity bench-mark farm, when using an interest rate of 2 percent as compared to 6 percent. The identical situation in the high equity bench-mark farm yielded only an 8.4 percent difference per year during the repayment period of the loan. Part of the relative difference was accounted for by the slightly lower volume of credit used for the high equity bench-mark farm.

The effect of alternative interest rates was also found to have a fairly significant impact on the relationship between operator's equity, size of loan and term of loan. In this instance, the impact was most significant when comparing these relationships over an extended loan repayment period. The low equity bench-mark farm indicated a required level of operator equity of 5.3 percent for a 2 percent interest loan carried over a 20 year period. This compares to a 33.6 percent equity requirement when using a 6 percent interest loan. On the basis of a 10 year loan, however, only a 9.4 percent difference in operator equity separated the results of the 2 percent and the 6 percent interest rate (48.0 percent as compared to 57.4 percent). This same pattern existed in the high equity bench-mark farm.

It was concluded that provision of subsidized interest rates (especially

at the 2 percent level) could enable fairly significant increases in family living standards, especially for the smaller size farm. Equally as important, this interest rate subsidy could enable larger loans to be granted relative to the farmer's equity. Where repayment terms tended to be less than 10 years, however, the benefits to the farmer of a subsidized interest rate became less significant as the principal repayment assumed a progressively larger share of the annual payment.

6.2.4 The Need for a Revolving Loan Fund as a Means of Providing for Flexibility of Loan Repayment, and to Meet Operating Costs During Years of Low Income

Analysis of the effects of income variation over a 20 year period (low equity bench-mark farm) indicated that in the absence of annually renewable credit, family living standards after loan repayment could reach extremely low levels in some years. Over the 20 year period studied, the family living allowance after loan repayment dipped to below $600 in two years, even after provision had been made for deferring depreciation reserves. Where depreciation reserves were not deferred, family living standards fell below the $1,800 level selected, in six of the 20 years. The major significance of the depressed level of income in certain years is that for the most part, the farmer can only restrict his level of family living to a basic minimum level. Below that, he would probably be forced to sell off productive assets or otherwise restrict his potential for production in a future year. The impact of a low income year could thus conceivably be felt equally strong in future years.

When the selected income period was matched up with provision of a revolving loan fund, it was observed that the basic minimum of $1,800 per

year could be maintained during all 20 years provided that depreciation reserves could be deferred each year as needed, both to help repay the revolving loan fund, and to reduce the amount of additional credit actually needed in a given year.[1/] The sequence of income years studied in this instance enabled the revolving loan fund to be completely repaid at the end of year 20. Additional credit through the revolving loan fund was needed in only 3 of the 20 years studied, although these loans required refinancing in five additional years. No loan was larger than 11.5 percent of the total capital borrowed.

The use of annual depreciation reserves to bolster family living standards in a low income year meant that at the end of the 20 year period, capital assets in machinery and buildings would have been depleted by $4,384. Farming could not have continued beyond this time period without an additional loan to replace depreciated machinery and buildings. For that matter, many of the depreciable assets would require replacement prior to the end of the 20 year period. Analysis of annual income available for family living did indicate, however, that there were a sufficient number of high income years so that all of the depreciable assets could have been replaced throughout the 20 year period, by restricting family living standards in each year to the $1,800 basic minimum. Income for the 20 year period amounted to $4,708 over and above the basic allowance of $1,800 per year.

One of the disadvantages noted for the revolving loan fund was that it made no positive provision for ensuring that surplus capital of high income

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1/ In considering that depreciation reserves would be used during low income years to repay the revolving loan fund and to maintain family living standard, it was felt that this would be the situation most likely to occur in actual practice. The low-income farmer (or most farmers, for that matter) does not consciously set aside funds each year to replace depreciable assets. He accomplishes much the same thing, however, by using high income years to replace needed machinery and buildings. In effect he lives on his depreciation during low income years and looks to the high income years in order to replace the depreciable assets.

years would not be used for non-productive purposes. In effect, the plan would work reasonably well only if the farmer was prepared to take advantage of high income years to replace his worn out and obsolete machinery and buildings. Even if the farmer was willing to do this, however, it was felt that the income surplus of a particular year might not be sufficient to replace a particular machine or building. In addition, the possibility existed that the low income years might well tend to follow in quick succession, thus not allowing replacement of depreciable assets at the right time. With this in mind, it was concluded that a major improvement in the revolving loan fund idea could be made by extending the provisions of this fund to enable money to be borrowed for machinery and building replacement. This would mean that machines and buildings could be replaced when needed, rather than only during high income years. A farmer would thereby be "encouraged" to re-invest the surplus of high income years back into the farm by the simple expedient of repaying advances made previously from the revolving loan fund. His machinery and buildings could thus be maintained at the appropriate level of capital investment so that production could continue unabated throughout the years. It was felt that in order for the suggested change to work, all such loans would have to be made on a year to year basis, with provision for annual renewal as needed. The expectation would be that the farmer would be required to retire such loans as soon as possible.

An expansion of the revolving loan fund idea to permit financing of depreciable assets would not necessarily mean more credit during the term of the loan. It would simply ensure that a farmer could borrow for depreciable assets as needed, with the expectation that this debt would be retired as soon as possible in the high income years. Essentially, it would enable the high income years to be "shifted" to the time period actually needed for

replacement of buildings and machinery.

In summary, provision for additional short term credit (including credit for machinery and building replacement) appeared as a very desirable adjunct to the intensification credit program. Although deferrment of depreciation reserves in any one year greatly lessened the impact of low income years, need was indicated during several of the years for an additional supply of credit in order to permit a minimum standard of family living, and to allow production to continue without restrictions in future years. If a revolving loan fund could be tied to the program of intensification credit, the farmer would be given the assurance of being able to borrow as needed, and the total credit program would be strengthened by enabling sustained farm production during low income years, and by ensuring that control was retained over all credit used by the farmer (supervision).

6.2.5 The Need for Intensification Credit to be Secured by the Complete Farm Unit

An analysis of the family living standards that would exist under loans administered on the basis of the Farm Improvement Loans Act (conventional credit), as compared to loans under the assumed program of intensification credit, indicated a substantially higher living allowance available during the repayment period of intensification credit. Moreover, and probably just as significant, assets secured by the items purchased required fairly large degrees of operator equity. The low equity bench-mark farm, for instance, required an equity of 21.7 percent of the total capital added in the linear program. This involved $1,996 which would have been required as a cash down payment by the farmer on this size of unit. The high equity bench-mark farm, because of a slightly different investment capital use, required an operator's

equity of 22.18 percent of the total capital borrowed. This involved a cash down payment of $2,451.

Intensification credit, when secured by the complete farm unit, made it possible to extend loans at a level equal to 100 percent of the value of the assets purchased. This was considered to be an important feature in any program designed to help the low-income farmer. An equally important advantage of package loan security, however, was discovered to be the extended repayment term possible, particularly when considering working capital or assets with a fairly short depreciation life-time. The low equity benchmark farm, for instance, required some $3,500 working capital. Such working capital credit as is conventionally available would normally be on a one year repayment basis. This would force the farmer to either accumulate this amount during the year, or refinance some part of it prior to commencing the next year's operation. Under a system of package loan credit, however, security against the whole unit could be used to enable a loan for working capital to be amortized over a period of years. Each capital asset purchased, despite its expected life, could also be financed over an extended period if such was needed in order to maintain a satisfactory standard of family living during the loan repayment period.

It was also noted that in many instances, a development time period is required before new resources can be successfully assimilated into the farm and made fully productive. Very often, the time allowed for repayment of conventional credit is scarcely longer than the time needed for the asset purchased with the use of credit to be brought into full production. As a result, the farmer is forced to repay the loan with funds earned elsewhere on the farm, rather than from the extra income generated by the newly acquired

resources. Extended repayment terms possible under package type security could have the decided advantage of enabling the added resource base to "pay its own way."

It was concluded that securing credit on the basis of the complete farm unit was an essential prerequisite of a program of supervised intensification credit. Without this provision, the low-income farmer would be forced to have a fairly substantial reserve of ready cash in order to meet the down-payment requirements of loans secured on the basis of the assets purchased. This cash down-payment requirement was felt to be a major stumbling block in the use of credit by the low-income farmer. If security could be taken on the complete farm unit rather than on the asset purchased, it was assumed that the need for a cash down-payment could be waived and in all likelihood, the loan would be secured at least as well, if not considerably better. Moreover, the provision of longer repayment periods would lessen the strain on family living standards during the repayment period. This would be especially so during the time required to initiate full production capabilities from the use of the additional credit.

6.3 The Place for a Program of Intensification Credit in the Broadview Rural Development Area

6.3.1 Potential Scale of Program

Bench-mark farms used in the analysis phase of this study were chosen on the basis of operator's equity. Using this criterion, a total of 84 farms of all age groups were estimated to qualify for a proposed program of intensification credit, on the basis of having $20,000 or less net farm assets. Separation of this group of farmers into three equity levels enabled

the synthesis of a bench-mark farm for each of the upper and lower equity groups, and an average bench-mark farm covering all groups. The low equity bench-mark farm (300 acres) compared closely to a one-half section size farm while the high equity bench-mark farm (505 acres) approximated a three-quarter section farm. The average equity bench-mark farm contained 438 acres.

Analysis of the income potential of each of the three bench-mark farms, using a $20,000 available credit fund, revealed that to a large extent, the land base available to the farmer determined the final level of income that could be expected from optimum resource use. Available land base played a predominant part in affecting the final income picture, due chiefly to the fact that the farmer was assumed to produce all his own feedstuff and to carry out needed farm operations within the framework of his own and family labor supply. Because of this predominant role that total acreage played in determining income levels, the potential for intensification credit in the Broadview Rural Development Area was re-examined from the standpoint of total acreage available to the farmer. Also, because the age of operator (and subsequent time for loan repayment) figured strongly in the level of family living standard available during the repayment period of a loan, this factor was also included in the evaluation.

Background data for the Broadview Rural Development Area indicated that of the 222 farms surveyed, 64.4 percent were one section or less in total acreage. Almost one quarter of the total farms consisted of 160 acres or less. Further analysis of the farms comprising one section or less indicated a very low proportion of cultivated acreage as a percent of total acreage. In the 321 to 640 acre category, only 55.6 percent of the total acreage was

under cultivation. Less than 57 percent of the land in the 320 acre or under farms was cultivated. Although no cost and returns data was enumerated for these farms, a broad comparison between the land base available to the two size groups and that available for the bench-mark farms suggested that without adequate credit to develop these units, a low level of returns could be expected.

In an effort to establish just how many farms might be considered eligible for a program of intensification credit, all farms with 640 acres or less were separated out for further analysis. Those farms reporting 640 acres or more in total size were judged to have a sufficient land base to enable a minimum acceptable standard of living for the area. It was further considered that these farms could most likely qualify for some degree of conventional credit, based on the acreage potential available to the operator. Those farmers having less than 640 total acres in size were considered to be most in need of a program of intensification credit. This reasoning was based on the low acreage base and level of investment capital available to these farmers - factors which normally handicap attempts to obtain conventional credit, especially where additional land cannot be obtained.

A total of 143 farms surveyed in the Broadview Rural Development Area were one section or less in size. Of this number, 26 farmers had indicated their intentions of retiring in less than five years. Assuming that these farmers would not be directly affected by a program of intensification credit, this left 117 farmers who, on the basis of acreage, if not equity, would probably experience difficulty in obtaining conventional credit. A further 44 of the remaining farmers expressed a desire to farm for 15 years or less. Analysis of the bench-mark farms indicated that time available for debt repay-

ment was a critical factor in establishing how much credit could be advanced, if endeavoring to maintain a minimum standard of family living. This group of farms was accordingly judged to have a fairly limited potential for increased income through use of intensification credit. This left a total of 73 farmers who appeared to be sound prospects for the use of supervised intensification credit as a prerequisite to conventional credit. The bulk of this number (47) fell within the 321 to 640 acre size group, which linear programming had indicated as having the needed land base to ensure a good level of family living through judicious use of intensification credit. The remaining 26 farmers represented a size of farm where land base (under the type of farming assumed for the area) would probably limit family living standards to fairly modest levels, despite the use of intensification credit.

In summary, there appeared to be a fairly substantial number of farmers in the 0 to 640 acre size group who could profit by the use of intensification credit to round out their units. A total of 117 farmers could probably be assisted by some degree of intensification credit, while 73 of this number had sufficient years left in which to farm, so that full use could be made of intensification credit to substantially improve their standard of living.

6.3.2 Degree of Assistance Possible

A fairly substantial potential for development appeared likely for the majority of the smaller farms reported in the Broadview Rural Development Area. In particular, a considerable amount of future arable land was indicated in all size groups. The 0 to 320 acre size group, for instance, had a 28.2 percent potential increase in cultivated acreage through clearing and breaking operations. A similar figure (25.7 percent) was recorded for

the 321 to 640 acre size group. In both size groups, a large acreage of hay land, open pasture, and bush pasture was reported available for livestock operations.

Although the potential net farm income would vary with the circumstances of each unit, linear programming on the bench-mark farms indicated that with the use of intensification credit, a potential net farm income of approximately $9.50 would be available per total farm acre, based on average prices and yields, and based on the use of home produced livestock operations to utilize surplus grain, waste land, and assumed community pasture privileges. At an income level of this nature, the one-half section farm could anticipate a net farm income in the range of $3,000 per year. The one-section farm, on the other hand, could probably expect almost twice this level of returns. The actual amount of income left for family living, however, would depend on the relationship between the operator's equity and the total credit required to fully develop a given farm unit.

In assessing the degree of assistance possible through use of intensification credit, careful attention was given to the type of farm enterprise assumed most applicable to the area. In particular, it was felt that the type of farmer most likely to qualify on basis of need for intensification credit, would for the most part possess only an average or even sub-average level of management ability. This type of farmer was considered unlikely to embark on any farm operation where he would be required to either buy livestock for further finishing, or buy the necessary grain required to feed out the livestock. Similarly, it was assumed that land use would not likely be intensified through use of appreciable supplies of fertilizer, or specialty crops. Management supervision was considered essential to ensure the optimum

use of available resources within the framework of enterprises considered most appropriate for the farm. These assumptions had the effect of limiting income to the land base available to grow marketable crops and to grow out home produced livestock. Higher levels of net farm income with much less emphasis on land base, would undoubtedly have appeared if the operator had been assumed capable and willing to supplement his income through livestock operations calling for the purchase of both feeder animals and additional feed supplies.

6.3.3 Farm Resource Use Indicated for the Area

Without exception, the linear programming models designed to maximize net farm income through use of credit, resulted in the selection of a finished yearling operation as the major livestock operation. Although this selection was very much tied to the assumptions used in the prebudgets concerning prices, yields and costs of production, it nevertheless suggested the need for fairly intensive livestock operations as compared to the less intensive operation such as the cow-calf enterprise. Examination of the marginal value products for the cow-calf operation in the high equity bench-mark farm, for instance, revealed that $22.52 would be given up at the margin for each cow-calf unit forced into the program. A total of $9.10 per cow at the margin would be lost from income if instead, the yearlings off grass operation was substituted for the finished yearling operation. Slightly lower marginal value products existed for those operations in the low equity bench-mark farm ($19.25 for the cow-calf operation and $5.48 for the yearlings off grass).

The hog enterprise showed up in the linear programming results only when

no credit was assumed available. As soon as credit was made available to the farm, the hog operation was replaced by the finished yearling operation and an extensive land improvement program. The inclusion of a double farrowing hog operation in the low equity bench-mark farm, programmed under maximum credit use, would have reduced farm income by $41.97 per sow at the margin. Only $8.29 would have been sacrificed per sow at the margin, had this enterprise been forced into the final program (using intensification credit) for the high equity bench-mark farm.

Community pasture privileges were found to be capable of yielding a substantial margin of added income in both the low and high equity bench-mark farms. The marginal value product of community pasture (per acre of open pasture equivalent) stood at $2.89 and $2.05 for the high and low equity bench-mark farms, respectively. This compares to the assumed actual cost of $1.75 per acre equivalent. Provision of community pasture privileges in the resource supplies of both programs allowed for a substantially increased income through expansion of the beef cattle operation.

Some indication of the stability of the finished yearling operation in each program (assuming all other prices to remain constant) was obtained from a study of the range of prices within which this operation would remain in the final program. In the low equity bench-mark farm, finished yearlings were indicated as being stable within the range of $158.89 and $181.14 per cow unit. This amounted to a price range of from $22.86 to $26.06 per hundred weight for the finished yearlings. The high equity bench-mark farm indicated a condition of stability between the price of $150.75 and $168.75 per cow-yearling unit. Converted to a price per hundred weight basis for the finished steer, this amounted to a stable price range of from $21.69 to $24.28 per hundred weight.

The potential value of additional cultivated land in both the high and low equity bench-mark farms showed up to be considerably in excess of the costs assumed for clearing and breaking. Marginal value products for arable bush pasture, for instance, were $7.38 for the high equity bench-mark farm and $8.89 for the low equity bench-mark farm. Despite a $30 clearing and breaking charge, this class of land showed strong potential for development, based on the yield assumptions used. Even non-arable bush pasture indicated a marginal value product of $3.39 per acre and $2.55 per acre (high and low equity bench-mark farms, respectively). This indicated a net marginal value of $41.50 above clearing costs (capitalized at 6 percent) for the high equity bench-mark farm as compared to $27.50 for the low equity bench-mark farm.

In summarizing the place for a program of intensification credit both in general and as it might apply to the Broadview Rural Development area, several factors seemed worthy of special consideration. In the first instance, available land base was found to be a critical determinant of the size of income that might be expected from use of intensification credit. Many of the smaller farmers, and especially those on the one-quarter section farm, did not appear to have the potential for more than a marginal standard of family living, regardless of the amount of intensification credit available for their use. This fact suggested that a program of intensification credit directed to this scale of farming would be of very doubtful value where the objective was to provide for the capital accumulation needed for conventional credit. Although substantial improvements in the relative level of family living could be anticipated, the future for an economic unit would best be described as bleak and uncertain. Accordingly, it appeared that a program

of intensification credit might best be carried out in conjunction with programs designed to facilitate land transfer and to provide for control of additional land base. In particular, community pasture development showed strong promise as a means of enabling the small farmer to improve his income position through expansion of his cattle operation. Clearing and breaking was also indicated as a profitable course of action.

Age of operator was found to be a second key determinant of the success or failure of a program of intensification credit. For the older farmer, only modest amounts of intensification credit appeared feasible when considering the impact of such credit on family living standards during the repayment period. Intensification credit would be of varying degrees of assistance in improving family living standards, but would be unlikely to pave the way for an economic unit at some future date. This fact suggested that in terms of an adjustment program, intensification credit could carry a much greater impact in an area if combined with a program which would facilitate the transfer of farms from the older generation to the younger farmer in serious need for a greater land base. Such a program would ensure that the low-income farm problem would not be perpetuated in that land held by retiring farmers could be "directed" to the use of younger farmers still remaining in the area. The added land base then available to the younger farmer would subsequently provide an even greater scope for the use of intensification credit.

A final consideration that is worthy of mention in discussing the place for intensification credit is the future prospects envisaged for farming. It was assumed that for many young farmers, especially those with a fairly substantial land base, intensification credit could be of considerable assist-

ance in allowing them to accumulate the assets needed for obtaining conventional credit. If, however, continued pressures are in effect on costs of production and farm produce returns, then it must be recognized that the need for increasing the size of unit may actually grow at a faster pace than the farmer is able to accumulate assets from use of intensification credit. It is entirely possible that minimum equity requirements for conventional credit may continue to rise so that the impact of intensification credit would be destined to simply maintaining the relative income base of the low-income farmer, rather than closing the gap. In this respect, intensification credit would serve only to perpetuate the poverty situation, by discouraging needed migration out of agriculture. If, however, intensification credit could be administered in conjunction with programs enabling the effective control of a greater land base, this danger would be considerably minimized.

CHAPTER VII

SUMMARY

Rapid technological changes, coupled with an increasingly unfavorable ratio of costs and returns, have tended to bring a severe economic "squeeze" on many of Saskatchewan's "small" farmers. In order to adjust to changing agricultural conditions, the small farmer has been forced to expand his production base, either through additional land or through more intensive use of present land. Either or some combination of these adjustments require substantial amounts of credit. Conventional credit, however, has been becoming more difficult to obtain by the low-income farmer who now faces the dilemma that first, he must show promise of attaining an "economic" unit with the use of credit, prior to qualifying for a loan; and secondly, in order to expand his operation to this point, he requires a substantial amount of collateral before he can qualify for the size of loan needed to establish an economic unit. This study, recognizing the critical situation now facing many of the low-income farmers, was undertaken to explore the adjustment potential that might exist in a program of intensification credit, administered with a high degree of management supervision in lieu of extensive loan security and cash downpayment requirements.

In establishing the guidelines for the study, two main areas were designated for study:

1. The formulation of principles governing the use of intensification credit with respect to the relationship existing between size of loan, purpose of loan, term of loan, and operator's equity when considering specific levels of family living and net farm income, and when considering

specific objectives of the loan.

2. The potential for a program of intensification credit (as formulated from a study of the relationships listed in the previous point) in upgrading the income level of the low-income farmer in general, and in providing the basis for later graduation to conventional credit.

Mathematical models were used to establish in a general way, the relationships between size of loan, operator equity, interest rates, term of loan and earning ability of the farm. These relationships were then used to formulate a general outline for the use of supervised intensification credit. Two specific program of intensification credit were subsequently established on the premise that two types of assistance were necessary - a program to raise the family living standard of farmers due shortly for retirement, and a program to enable younger farmers to accumulate the resource base needed for graduation to conventional credit at a later date. The "short-term" adjustment program designed to maximize family living standards was assumed to best meet this goal if loans were restricted to purchase of machinery and equipment, livestock, building repairs and minor renovations, and cash operating inputs. The term of this loan was set at a maximum of 10 years with the proviso that all loans would have to be repaid by the time the farmer reached age 65. This phase of intensification credit was assumed restricted to farmers age 55 or over. The "long-run" adjustment program, on the other hand, was tailored specifically to providing the management advice and credit needed to move the younger farmer to the point where he could eventually qualify for conventional credit. Twenty years or to age 65 was assumed as the maximum term allowable for this type of loan. Both hypothetical loan programs were assumed to be capable of carrying themselves

at a market rate of interest (6 percent). Each loan program was given a maximum loan fund of $20,000 per farmer, with the requirement that the size of the loan be based on the operator's equity. In each instance, the operator was assumed to need a basic equity of 40 percent of the final capital used in the farm, plus 2 percent for each year the farmers age exceeds 45. Security requirements were assumed to be best met by a package type loan which would enable security to be taken against the whole farm, rather than against the asset purchased. This enabled potential lending with no downpayment on behalf of the operator. Provision for flexible repayment was allowed for through use of a revolving loan fund which would enable a farmer to borrow in any one year, up to 20 percent of the original loan on an annually renewable basis. The interest rate for the revolving loan fund was arbitrarily set at 7 percent to make allowance for the shorter term, higher risk aspect of such a loan.

Linear programming was selected as the main analytical tool used in the study. This selection was based primarily on the need to establish optimum resource use patterns both with and without the use of credit. Linear programming enabled farm income under alternative resource use patterns to be studied in terms of a single variable - credit. Two basic programming models were designed - one to select the resource combination needed to maximize net farm income and the other to select the combination of resources leading to maximum family living standard during the repayment period assumed for the loan. Both programs contained the identical enterprises, namely, five land use rotations; a cow-calf, a finished calf, a yearling off grass, and a finished yearling cattle operation; a single and a double farrowing hog operation. No purchase of feed or feeder animals was permitted in order

that the resulting resource use would be representative of the type of farming most likely to be encountered within the low-income farmer segment in general. This restriction forced all farm resource use to be based solely on the feed and livestock base available to the farm.

In order to test the assumptions used for the credit program, bench-mark farms were selected in the Rural Development Area of Broadview. Selection of these farms was facilitated by records collected in conjunction with a Rural Development Survey conducted in 1963. All farmers possessing $20,000 or less net farm assets were separated out on the assumption that this equity level would not normally permit the use of conventional land based mortgage credit. Eighty-four farmers were found to qualify under this assumption. The qualifying farms were grouped according to equity in order to permit the synthesis of bench-mark farms covering a broad range of operator equity. The bottom one-third of the farms provided the basis for the low equity bench-mark farm. A high equity bench-mark farm was developed from the top one-third of the farmers, sorted by operator equity. All farms in this selected group of 84 were then used to arrive at an "average" equity bench-mark farm. The resulting three bench-mark farms provided the empirical base for a subsequent analysis of the degree of assistance offered by intensification credit.

The first phase of the analysis considered the joint question of how effective the assumed program of intensification credit would be in improving family living standards in general, and in facilitating the transition to conventional credit.

In testing the effectiveness of the proposed credit program from the standpoint of increased net farm income (and family living standards), linear

programs were run on the low and high equity bench-mark farms. These programs, designed to maximize net farm income, indicated that with the use of intensification credit, a potential net farm income of $2,892 could be obtained for the low equity bench-mark farm (300 total acres) and $4,738 for the high equity bench-mark farm (505 acres). Total capital requirements were found to be $22,310 and $30,990 for the low and high equity bench-mark farms, respectively. Actual credit used was $12,148 for the low equity bench-mark farm and $11,026 for the high equity bench-mark farm. Use of this credit enabled a 354.8 percent increase in net farm income for the low equity bench-mark farm and a 207.6 percent increase for the high equity bench-mark farm. It was concluded that the land base available to the farmer was a critical determinant of the degree of assistance that could be hoped for through the use of intensification credit. At the one-half section size of farm (represented by the low equity bench-mark farm) a modest level of net farm income could be expected with optimum resource use. The level of operator's equity in the final unit would in large part determine if the income residual after debt repayment would be sufficient to meet family living needs during the repayment period of the loan. Based on the actual equity position reported for this bench-mark farm ($10,162), an $1,833 family living standard per year could be expected during the repayment period of the loan (assuming 20 years for repayment). Reducing the term to 10 years enabled just over a $100 per month to be retained for family living. When size of farm was increased to approximately a three-quarter section farm (represented by the high equity bench-mark farm) a much more significant net farm income figure appeared possible through use of intensification credit. This net farm income ($4,738) was of sufficient scale that even on the basis of a 10 year

loan, the operator could have retained a $3,240 family living standard during the repayment period of the loan, given the $19,964 equity established for this unit.

Analysis of the part that intensification credit could play in graduating a farmer to conventional credit revealed that his chances in this regard were determined by four factors:

(i) His age at the commencement of intensification credit use.

(ii) His equity in the farm unit.

(iii) The level of family living standard required during the repayment period of the loan.

(iv) The land base available to the farm.

This section of the analysis was completed by establishing at a given level of family living, the potential debt repayment and capital accumulation that would be possible for each of the low and high equity bench-mark farms. These data were then used to establish the required level of operator equity at alternative debt repayment periods, if the operator was to accumulate $30,000 net assets by age 45. The analysis indicated that a farmer possessing the scale of farm represented by the low equity bench-mark farm could successfully graduate to conventional credit only if he was very young at the time of taking out the loan, or if he had already developed a substantial equity in the farm. In all cases, he would be required to accept a very low standard of family living during the repayment term of the loan. By the time that this farmer reached forty years of age, his chances for using intensification credit as a prerequisite to conventional credit, appeared to be very slim. Considerably greater potential was found to exist when dealing with the size of farm represented by the high equity bench-mark farm. Even

when electing to maintain a $2,400 annual family living standard, a 22 year old beginning farmer required only a 7.2 percent equity ($2,224) in the total farm unit in order to accumulate by age 45, the assets assumed necessary for graduation to conventional credit.

The second major phase of the study, the testing of principles assumed for the use of intensification credit, again made use of the linear programming results for each of the three bench-mark farms. This phase of the analysis was directed to testing several specific assumptions:

1. That a short and long-term credit program are necessary, depending on whether the objective is maximum family living standards or maximum net farm income.

2. That size of loan for both programs must be based on the operator's equity and the time available for repayment.

3. That an interest rate of 6 percent is feasible in both the long and short-term credit program.

4. That a revolving loan fund is needed to provide flexibility of loan repayment and to sustain production following low income years.

5. That loan security is best taken against the whole farm, rather than against the asset purchased.

The average equity bench-mark farm was used as the basis for determining whether or not there was a need for both a short-term and a long-term credit program. Both linear programming models were used to establish the farm resource structure under the alternative goals of maximum net farm income and maximum family living standards. No apparent difference in resource structure or credit use was found to exist as between the two programs. A somewhat higher family living standard ($2,714 as compared to $2,642) appeared

when programming for maximum family living standard on the basis of a 10 year loan. Programming for maximum family living standard, however, resulted in a reduction of $174 in net farm income. It was concluded that there was no apparent need for carrying on two separate lending programs when considering alternative goals of maximum net farm income or maximum family living standard. The major criterion to be employed in either case was that credit be used in its most productive use, regardless of what this use might be. It was felt, however, that there is some justification for restricting the over-all level of credit, when desiring to increase family living standards of older farmers. This restriction on total credit use would ensure that the resulting higher average returns from the use of this credit would be more nearly in line with the high degree of capital accumulation required over a short repayment term.

Analysis of the relationships between size of loan, operator equity, interest rates, repayment term and family living standards was conducted on the income and investment data revealed for the low and high equity benchmark farms, programmed for maximum net farm income, with provision for credit as needed. The potential for debt repayment was calculated for each benchmark farm, on the basis of specified family living standards and alternative repayment periods, using the net farm income data established for linear programming. At each repayment period assumed, a potential debt loan at 6 percent interest was established. From this, the required level of operator's equity was calculated as a percentage of total capital requirements. This analysis revealed that again, scale of farm was a vital factor in determining the debt-asset ratio that would be needed under varying conditions of operator's age, desired level of family living and interest rate. Large

amounts of credit were found to be possible for the low equity bench-mark farm, only if the operator would accept a low standard of living during the repayment period of the loan, and only if a long repayment period existed. A farmer on this scale of farm, for instance, would be able to borrow the maximum assumed limit ($20,000) only if he had 20 years in which to repay the loan, and only if he would be prepared to accept a $1,200 family living standard during the term of the loan. A much more favorable experience was revealed for the high equity bench-mark farm, where the full $20,000 could be borrowed over a 12 year period while still enabling the farmer to enjoy a $2,400 family living standard during the repayment term of the loan.

The assumption made as to equity requirements based on term of loan (40 percent basic equity plus 2 percent for each year the farmer exceeds age 45) was discovered to be reasonably satisfactory on the low equity bench-mark farm, but considerably out of line for the high equity bench-mark farm. In this regard, it was concluded that a more satisfactory equity requirement provision would be one giving some acknowledgement to the overall level of capital investment.

Interest rates charged on the use of intensification credit showed up as having a fairly significant impact on the family living standards available at all debt repayment terms. In this instance, family living standards were calculated for each of the low and high equity bench-mark farms, using alternative interest rates of 2 percent and 4 percent over selected repayment periods. Comparison of the level of family living standard under the 2 percent interest rate and the 6 percent interest rate, indicated an increase of 17.23 percent and 7.59 percent for the high and low equity bench-mark farm, respectively. The potential debt load that could be handled at each

of 2, 4 and 6 percent interest rates was subsequently calculated at alternative repayment terms for each bench-mark farm, assuming a $1,600 family living standard. From this, the required level of operator equity at each interest rate was calculated for varying repayment periods. A substantially reduced level of required operator equity was found to exist with the 2 percent rate, and to a lesser extent, the 4 percent rate. The difference in equity requirements at the alternative rates became considerably less significant with shorter repayment terms for the loans.

Analysis of the need for a revolving loan fund was undertaken by means of estimating the residual for family living over a 20 year loan repayment period. The low equity bench-mark farm was used as the basis for this analysis. Net farm income over the 20 year period was allowed to vary by 90 percent of the variation experienced in wheat yields for the Broadview area over the period from 1944 to 1963. An $1,800 allowance for family living was charged each year, leaving the residual for debt repayment. In years where this residual was insufficient to cover the debt repayment shown for this bench-mark farm the depreciation allowance for the year was deferred to help meet the difference. It was found that even with deferrment of depreciation reserves, debt repayment could not be met in all years without a substantial reduction in family living standards. The use of a revolving loan fund, however, enabled the basic $1,800 family living standard to be maintained each year, while at the same time ensuring that production would not be impaired during or following years of low income.

Package-type loan security was compared to conventional security where a loan is secured by the item purchased. Actual loan uses indicated in each of the low and high equity bench-mark farms were assumed secured on the same

basis as loans taken through the Farm Improvement Loans Act. A comparison was then made of the family living standard that would be available under the assumed program of intensification credit and under the credit facilities available under the Farm Improvement Loans Act. Analysis results revealed that where loans were secured by the asset purchased, a substantial downpayment was required of the operator; and in addition, family living standards during the initial stage of the loan were severely depressed because of the high capital accumulation associated with the short repayment term. Loans available under the assumed program of intensification credit, however, indicated no downpayment and a larger family living standard during the loan repayment period. It was concluded that the needs of the low-income farmer would be more adequately met if security was taken on the complete farm unit, rather than on the asset purchased.

A final survey was made of the potential for the program of intensification credit in the Broadview Rural Development Area. It was estimated that the use of such a program in this area could enable a potential net farm income of $9.50 per total farm acre, based on average prices and yields, and based on the use of home produced livestock operations to utilize surplus grain, waste land, and community pasture privileges. This suggested that a half-section farm could anticipate approximately $3,000 net farm income per year with the optimum resource use made possible by intensification credit. Some 73 farmers appeared young enough to be sound prospects for a program of intensification credit designed to assist them in attaining the assets need for conventional credit. This represented approximately one-quarter of the farmers resident in the area and about 51 percent of those farmers in the area who were judged to be not eligible for conventional credit. The remain-

ing 49 percent of the farmers considered not eligible for conventional credit were felt to be at an age level where intensification credit would be used primarily for giving them an increased standard of living during their remaining years on the farm.

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A P P E N D I C E S

APPENDIX A

YIELD DATA ASSUMPTIONS, BROADVIEW RURAL DEVELOPMENT AREA

1. Grain Yields (20 year average, 1944 - 1963):

	Wheat	Oats	Barley	Fall Rye	Flax
	- Bushels per Acre -				
Av. R. M. Yields 1/	20.7	34.3	26.8	16.6	9.3
Estimated Fallow Yields 2/	22.4	42.7	31.9	-	10.7
Estimated Stubble Yields 2/	13.8	29.3	21.7	-	6.5

2. Estimated Grading of Wheat, 1953 - 1963, Crop District #1 1/

Grading #1 - 3.6%

Grading #2 - 32.2%

Grading #3 - 32.8%

Grading below #3 - 31.4%

3. Pasture Yields (Mechanical Grazing): 3/

	Tons/Acre
Tame Pasture	1.5
Open Native Pasture	.6
Bush Pasture	.3

1/ Based on data received from the Supervisor of Statistics, Saskatchewan Department of Agriculture.

2/ The average R. M. yields were converted to estimated summerfallow and stubble yields by using the relative provincial fallow-stubble yields for each grain as reported by the Supervisor of Statistics, Saskatchewan Department of Agriculture for 1957 to 1963.

3/ Pasture yields were based on the following relationships:

$$\text{Tame Pasture} = .67 \times \frac{\text{Fallow Wheat Yield}}{10} = 1.5 \text{ Tons/Acre}$$

$$\text{Native Open Pasture} = \frac{\text{Tame Pasture Yield}}{2.5} = .6 \text{ Tons/Acre}$$

Bush Pasture = 50% of Native Open Pasture = .3 Tons/Acre

4. Carrying Capacity (Summer Pasture Only - 6 months):[4/]

	Tame Pasture	Open Native	Bush Pasture
	- Acres per Animal Per Summer -		
Cow	1.9	4.7	9.4
Calf	.5	1.3	2.6
Total Cow-Calf	2.4	6.0	12.0
Yearling	1.2	3.0	6.0

4/ Carrying capacity of pasture was calculated by estimating summer feed requirements for each class of animal and yield by type of pasture for grazing purposes:

Summer Feed Requirements on Pasture:

Feed requirements were assumed to be 2 pounds roughage per day per 100 pounds body weight.

	Av. Weight	Lbs./Day	Lbs./Summer (180 days)
Cow	1100 lbs.	22	3,960
Calf	300 lbs.	6	1,080
			Total Cow-Calf 5,040 lbs.
Yearling	700 lbs.	14	2,520

Pasture Yields for Grazing:

Pasture carrying capacity was assumed to be 70 percent of the hay yield in dry roughage equivalent.

Tame Pasture = 1.5 x .7 = 1.05 tons x 2,000 = 2,100 lbs.
Native Open = .6 x .7 = .42 tons x 2,000 = 840 lbs.
Bush Pasture = .3 x .7 = .21 tons x 2,000 = 420 lbs.

Acres Required by Class of Animal:

	Cow	Calf	Yearling
Tame Pasture	$\frac{3,960}{2,100} = 1.89$	$\frac{1,080}{2,100} = .51$	$\frac{2,520}{2,100} = 1.2$
Native Pasture	$\frac{3,960}{840} = 4.71$	$\frac{1,080}{840} = 1.28$	$\frac{2,520}{840} = 3.0$
Bush Pasture	$\frac{3,960}{420} = 9.43$	$\frac{1,080}{420} = 2.57$	$\frac{2,520}{420} = 6.0$

APPENDIX B

GRAIN AND LIVESTOCK PRICE DATA

1. Grain and Feed:

	On Farm Price	Elevator Price (Basis Broadview)
Wheat	$1.40/bus.	$1.45/bus.
Oats	$0.56/bus.	$0.59/bus.
Barley	$0.81/bus.	$0.84/bus.
Flax	$2.90/bus.	$2.95/bus.
Native Hay Tame Hay (Mixed)	Assumed to be not saleable	

2. Livestock:

	Price at Winnipeg Market
Calves off Grass	$24.00/cwt. (Sept).
Finished Yearlings (800 lbs.)	$22.50/cwt. (April)
Feeder Yearlings (820 lbs.)	$21.50/cwt. (October)
Cull Cows	$14.00/cwt. (October)
Market Hogs, Dressed 1/	$23.50/cwt. (December)

1/ Net prices after marketing costs.

APPENDIX C

BUILDING SPACE AND INVESTMENT REQUIREMENTS

Class of Animal	Square Feet/ Animal	Cost/Sq. Ft.	Total Investment/Unit
		$	$
Breeding Cow/Winter	45	0.80	36.00
Cow/Calf	70	0.80	56.00
Cow/Calf/Yearling	110	0.80	88.00
Brood Sow (Single Farrowing)	60	1.25	75.00
Brood Sow (Double Farrowing)	90	2.00	180.00

APPENDIX D

INVESTMENT REQUIREMENTS AND COST DATA
BASIC MACHINERY COMPLEMENT

Item	Size	Purchase Price 1/ New	Purchase Price 2/ Second-Hand	Fixed Cost 3/ Per Year (Second-Hand)	Variable Cost 4/ Per Hour (Second-Hand)
		$	$	$	$
Tractor	40 H.P.	4,300	1,290	217	1.03
Cultivator (H.D.)	10'	900	315	44	.22
Disker (including Seeding attachment)	12'	1,540	539	77	.37
Rodweeder	21'	1,000	350	50	.24
Harrows (Flexible)	33'	375	135	20	.09
Packers	24'	1,000	360	52	.24
Swather (P.T.O.)	12'	1,300	455	71	.44
Totals	N/A	10,415	3,444	531	N/A

1/ Based on average prices applicable in 1964 (Regina).

2/ Machinery assumed to be approximately 7 years of age at time of purchase.

3/ Fixed costs include depreciation, investment cost and insurance and housing.

4/ Variable costs include gas, oil, grease, repairs, but not labor.

APPENDIX E

VARIABLE MACHINE COSTS PER ACRE, SELECTED OPERATIONS[1/]

Operation	Acres/ Hour	Tractor Cost/ Hour	Implement Cost/ Hour	Total Cost/ Hour	Total Cost/ Acre
		$	$	$	$
Tractor and Disker (Seeding)	3.8	1.03	0.37	1.40	0.37
Tractor and Disker	4.1	1.03	0.37	1.40	0.34
Tractor and Rodweeder	7.5	1.03	0.24	1.27	0.17
Tractor and Cultivator	3.6	1.03	0.22	1.25	0.35
Tractor and Packer	12.0	1.03	0.24	1.27	0.11
Tractor and Harrows	13.2	1.03	0.09	1.12	0.08
Tractor and Swather	6.0	1.03	0.44	1.47	0.25

1/ Costs are based on use of second-hand machinery. No labor costs are included.

APPENDIX F

DESCRIPTION OF REAL ACTIVITIES USED IN LINEAR PROGRAMMING MODEL

Activity Number	Description
P. 1	Rotation #1 (Wheat-Fallow)
P. 2	Rotation #2 (Wheat-Wheat-Fallow)
P. 3	Rotation #3 (Wheat-Barley-Fallow)
P. 4	Rotation #4 (Barley-Oats-Fallow)
P. 5	Rotation #5 (Oats, Brome-Alfalfa, Brome-Alfalfa, Brome-Alfalfa, Brome-Alfalfa, Fallow)
P. 6	Cow-Calf
P. 7	Finished Calf
P. 8	Feeder Yearlings off Grass
P. 9	Finished Yearlings
P.10	Hogs, Single Farrowing
P.11	Hogs, Double Farrowing
P.12	Selling Wheat
P.13	Selling Oats
P.14	Selling Barley
P.15	Clear & Break, Arable Open Pasture
P.16	Clear & Break, Arable Bush Pasture
P.17	Clear & Break, Arable Idle Land
P.18	Rebreaking Tame Grass
P.19	Clear Bush Pasture, Not Arable
P.20	Hay Production, Tame Grass
P.21	Native Hay Production, Open Pasture, Not Arable
P.22	Pasture Supply, Tame Grass
P.23	Pasture Supply, Open Pasture, Not Arable
P.24	Pasture Supply, Bush Pasture, Not Arable
P.25	Pasture Supply, Idle Land, Not Arable
P.26	Pasture Supply, Arable Open Pasture
P.27	Pasture Supply, Arable Bush Pasture
P.28	Pasture Supply, Arable Idle Land
P.29	Community Pasture Rental
P.30	Purchasing Livestock Buildings
P.31	Purchasing Grain Storage
P.32	Borrowing for Working Capital
P.33	Borrowing for Investment Capital
P.34	Baling Straw
P.35	Roughage Substitution
P.36	Feed Grain Substitution
P.37	Capital Substitution
P.38	Credit Repayment
P.39	Native Hay Production Bush Pasture, Not Arable
P.40	Native Hay Production, Arable Bush Pasture
P.41	Native Hay Production, Arable Bush Pasture

APPENDIX G

LINEAR PROGRAMMING MATRIX

Resource Restrictions		Unit	Resource Level By Bench-mark Farm: Low Equity (Prog.3, Prog.4)	Average Equity (Prog.1, Prog.2)	High Equity (Prog.5, Prog.6)
P134	Owned Working Capital	$100	0	0	0
P135	Owned Investment Capital	$100	5.43 b/	34.5	47.56
P136	Credit Supply Fund a/	$100	200.0	200.0	200.0
P137	Crop Acres	Acre	138.0	215.0	235.0
P138	Tame Grass	Acre	6.0	14.0	20.0
P139	Open Pasture, Not Arable	Acre	60.0	74.0	64.0
P140	Bush Pasture, Not Arable	Acre	29.0	29.0	39.0
P141	Idle Land, Not Arable	Acre	21.0	26.0	27.0
P142	Arable Open Pasture	Acre	12.0	29.0	44.0
P143	Arable Bush Pasture	Acre	17.0	41.0	71.0
P144	Arable Idle Land	Acre	17.0	10.0	5.0
P145	Mixed Hay Supply	Ton	0	0	0
P146	Native Hay Supply	Ton	0	0	0
P147	Wheat Supply	Bushel	0	0	0
P148	Oats Supply	Bushel	0	0	0
P149	Barley Supply	Bushel	0	0	0
P150	April-May Labor	Hour	500.0	500.0	500.0
P151	Total Annual Labor	Hour	2400.0	2400.0	2400.0
P152	Livestock Housing	$100	6.1	9.4	12.8
P153	Grain Storage	100 Bus.	23.67	33.0	37.36
P154	Community Pasture Privilege	Acre (Native	180.0	180.0	180.0
P155	Pasture Supply	Acre (Open Pasture	0	0	0
P156	Straw Supply	Ton	0	0	0
P157	Credit Repayment	$100	0	0	0
P158	Grain Sales Quota	Bushel	1000.0	1600.0	1800.0

a/ Credit supply fund was set at zero during initial programming in order to establish income level possible without the use of credit.

b/ See Page 100 for detailed information on the owned investment capital used for the low equity bench-mark farm.

Short Run	-5.26	-6.47	-6.46	-6.58
Long Run	-5.26	-6.47	-6.46	-6.58

Resource Restrictions	Rotation #1 P1 Acre	Rotation #2 P2 Acre	Rotation #3 P3 Acre	Rotation #4 P4 Acre
P134 Owned Working Capital	.0526	.0647	.0646	.0658
P135 Owned Investment Capital	0	0	0	0
P136 Credit Supply Fund	0	0	0	0
P137 Crop Acres	1.0	1.0	1.0	1.0
P138 Tame Grass	0	0	0	0
P139 Open Pasture, Not Arable	0	0	0	0
P140 Bush Pasture, Not Arable	0	0	0	0
P141 Idle Land, Not Arable	0	0	0	0
P142 Arable Open Pasture	0	0	0	0
P143 Arable Bush Pasture	0	0	0	0
P144 Arable Idle Land	0	0	0	0
P145 Mixed Hay Supply	0	0	0	0
P146 Native Hay Supply	0	0	0	0
P147 Wheat Supply	-11.2	-12.07	- 7.47	0
P148 Oats Supply	0	0	0	- 9.77
P149 Barley Supply	0	0	- 7.23	-10.63
P150 April-May Labor	.74	.70	.70	.70
P151 Total Annual Labor	1.24	1.26	1.26	1.26
P152 Livestock Housing	0	0	0	0
P153 Grain Storage	.112	.1207	.147	.204
P154 Community Pasture Privilege	0	0	0	0
P155 Pasture Supply	0	0	0	0
P156 Straw Supply	0	0	0	0
P157 Credit Repayment	0	0	0	0
P158 Grain Sales Quota	0	0	0	0

Short Run	-2.39	61.85	123.57	119.57	163.35
Long Run	-2.39	58.35	120.07	116.07	159.85

Resource Restrictions	Rotation #5 P5 Acre	Cow-Calf P6 Brood Cow	Finished Calf P7 Brood Cow	Feeder Yearlings Off Grass P8 Brood Cow	Finished Yearlings P9 Brood Cow
P134 Owned Working Capital	.0239	.2805	.3833	.3731	.4191
P135 Owned Investment Capital	0	1.75	1.75	1.75	1.75
P136 Credit Supply Fund	0	0	0	0	0
P137 Crop Acres	1.0	0	0	0	0
P138 Tame Grass	-.666	0	0	0	0
P139 Open Pasture, Not Arable	0	0	0	0	0
P140 Bush Pasture, Not Arable	0	0	0	0	0
P141 Idle Land, Not Arable	0	0	0	0	0
P142 Arable Open Pasture	0	0	0	0	0
P143 Arable Bush Pasture	0	0	0	0	0
P144 Arable Idle Land	0	0	0	0	0
P145 Mixed Hay Supply	0	2.0	2.6	2.9	3.3
P146 Native Hay Supply	0	0	0	0	0
P147 Wheat Supply	0	0	0	0	0
P148 Oats Supply	-4.88	0	28.0	16.0	25.0
P149 Barley Supply	0	0	24.0	0	20.0
P150 April-May Labor	.46	6.0	10.0	8.0	8.0
P151 Total Annual Labor	.85	25.0	35.0	33.0	43.0
P152 Livestock Housing	0	.36	.56	.56	.70
P153 Grain Storage	.0488	0	0	0	0
P154 Community Pasture Privilege	0	0	0	0	0
P155 Pasture Supply	0	6.0	6.0	9.0	9.0
P156 Straw Supply	0	.33	.66	.58	.83
P157 Credit Repayment	0	0	0	0	0
P158 Grain Sales Quota	0	0	0	0	0

Short Run	138.57	297.47	1.40	.56	.81
Long Run	138.57	297.47	1.40	.56	.81

Resource Restrictions	Hogs-Single Farrowing P10 Sow	Hogs-Double Farrowing P11 Sow	Selling Wheat P12 Bushel	Selling Oats P13 Bushel	Selling Barley P14 Bushel
P134 Owned Working Capital	1.0818	1.9603	.0005	.0003	.0003
P135 Owned Investment Capital	.85	.85	0	0	0
P136 Credit Supply Fund	0	0	0	0	0
P137 Crop Acres	0	0	0	0	0
P138 Tame Grass	0	0	0	0	0
P139 Open Pasture, Not Arable	0	0	0	0	0
P140 Bush Pasture, Not Arable	0	0	0	0	0
P141 Idle Land, Not Arable	0	0	0	0	0
P142 Arable Open Pasture	0	0	0	0	0
P143 Arable Bush Pasture	0	0	0	0	0
P144 Arable Idle Land	0	0	0	0	0
P145 Mixed Hay Supply	0	0	0	0	0
P146 Native Hay Supply	0	0	0	0	0
P147 Wheat Supply	0	0	1.0	0	0
P148 Oats Supply	105.8	192.5	0	1.0	0
P149 Barley Supply	85.5	137.0	0	0	1.0
P150 April-May Labor	10.0	9.0	0	0	0
P151 Total Annual Labor	60.0	110.0	.01	.01	.01
P152 Livestock Housing	.75	1.8	0	0	0
P153 Grain Storage	0	0	0	0	0
P154 Community Pasture Privilege	0	0	0	0	0
P155 Pasture Supply	0	0	0	0	0
P156 Straw Supply	1.25	2.5	0	0	0
P157 Credit Repayment	0	0	0	0	0
P158 Grain Sales Quota	0	0	1.0	.566	.8

Short Run	-.40	-.40	-.40
Long Run	-.40	-.40	-.40

Resource Restrictions	Clear & Break Arable -Open Pasture P15 Acre	Clear & Break Arable -Bush Pasture P16 Acre	Clear & Break Arable -Idle Land P17 Acre
P134 Owned Working Capital	.004	.004	.004
P135 Owned Investment Capital	.18	.30	.35
P136 Credit Supply Fund	0	0	0
P137 Crop Acres	-1.0	-1.0	-1.0
P138 Tame Grass	0	0	0
P139 Open Pasture, Not Arable	0	0	0
P140 Bush Pasture, Not Arable	0	0	0
P141 Idle Land, Not Arable	0	0	0
P142 Arable Open Pasture	1.0	0	0
P143 Arable Bush Pasture	0	1.0	0
P144 Arable Idle Land	0	0	1.0
P145 Mixed Hay Supply	0	0	0
P146 Native Hay Supply	0	0	0
P147 Wheat Supply	0	0	0
P148 Oats Supply	0	0	0
P149 Barley Supply	0	0	0
P150 April-May Labor	0	0	0
P151 Total Annual Labor	0	0	0
P152 Livestock Housing	0	0	0
P153 Grain Storage	0	0	0
P154 Community Pasture Privilege	0	0	0
P155 Pasture Supply	0	0	0
P156 Straw Supply	0	0	0
P157 Credit Repayment	0	0	0
P158 Grain Sales Quota	-7.0	-7.0	-7.0

Short Run	0	0	-7
Long Run	0	0	-7

Resource Restrictions	Rebreaking Tame Grass P18 Acre	Clear Bush Pasture - Not Arable P19 Acre	Hay Prod.- Tame Grass P20 Ton
P134 Owned Working Capital	0	0	.07
P135 Owned Investment Capital	.0305	.15	0
P136 Credit Supply Fund	0	0	0
P137 Crop Acres	-1.0	0	0
P138 Tame Grass	1.0	0	.66
P139 Open Pasture, Not Arable	0	-1.0	0
P140 Bush Pasture, Not Arable	0	1.0	0
P141 Idle Land, Not Arable	0	0	0
P142 Arable Open Pasture	0	0	0
P143 Arable Bush Pasture	0	0	0
P144 Arable Idle Land	0	0	0
P145 Mixed Hay Supply	0	0	-1.0
P146 Native Hay Supply	0	0	0
P147 Wheat Supply	0	0	0
P148 Oats Supply	0	0	0
P149 Barley Supply	0	0	0
P150 April-May Labor	0	0	0
P151 Total Annual Labor	0	0	2.0
P152 Livestock Housing	0	0	0
P153 Grain Storage	0	0	0
P154 Community Pasture Privilege	0	0	0
P155 Pasture Supply	0	0	0
P156 Straw Supply	0	0	0
P157 Credit Repayment	0	0	0
P158 Grain Sales Quota	0	0	0

Short Run	0	0	0	0
Long Run	-8	-.20	-.20	-.20

Resource Restrictions	Native Hay Open Pasture - Not Arable P21 Ton	Pasture Supply- Tame Grass P22 Acre	Pasture Supply Open Pasture - Not Arable P23 Acre	Pasture Supply Bush Pasture - Not Arable P24 Acre
P134 Owned Working Capital	.08	.002	.002	.002
P135 Owned Investment Capital	0	.04	.04	.04
P136 Credit Supply Fund	0	0	0	0
P137 Crop Acres	0	0	0	0
P138 Tame Grass	0	1.0	0	0
P139 Open Pasture, Not Arable	1.666	0	1.0	0
P140 Bush Pasture, Not Arable	0	0	0	1.0
P141 Idle Land, Not Arable	0	0	0	0
P142 Arable Open Pasture	0	0	0	0
P143 Arable Bush Pasture	0	0	0	0
P144 Arable Idle Land	0	0	0	0
P145 Mixed Hay Supply	0	0	0	0
P146 Native Hay Supply	-1.0	0	0	0
P147 Wheat Supply	0	0	0	0
P148 Oats Supply	0	0	0	0
P149 Barley Supply	0	0	0	0
P150 April-May Labor	0	0	0	0
P151 Total Annual Labor	2.0	0	0	0
P152 Livestock Housing	0	0	0	0
P153 Grain Storage	0	0	0	0
P154 Community Pasture Privilege	0	0	0	0
P155 Pasture Supply	0	-2.5	-1	-.5
P156 Straw Supply	0	0	0	0
P157 Credit Repayment	0	0	0	0
P158 Grain Sales Quota	0	0	0	0

Short Run	0	0	0	0
Long Run	-.20	-.20	-.20	-.20

Resource Restrictions	Pasture Supply Idle Land Not Arable P25 Acre	Pasture Supply -Arable Open Pasture P26 Acre	Pasture Supply -Arable Bush Pasture P27 Acre	Pasture Supply -Arable Idle Land P28 Acre
P134 Owned Working Capital	.002	.002	.002	.002
P135 Owned Investment Capital	.04	.04	.04	.04
P136 Credit Supply Fund	0	0	0	0
P137 Crop Acres	0	0	0	0
P138 Tame Grass	0	0	0	0
P139 Open Pasture, Not Arable	0	0	0	0
P140 Bush Pasture, Not Arable	0	0	0	0
P141 Idle Land, Not Arable	1.0	0	0	0
P142 Arable Open Pasture	0	1.0	0	0
P143 Arable Bush Pasture	0	0	1.0	0
P144 Arable Idle Land	0	0	0	1.0
P145 Mixed Hay Supply	0	0	0	0
P146 Native Hay Supply	0	0	0	0
P147 Wheat Supply	0	0	0	0
P148 Oats Supply	0	0	0	0
P149 Barley Supply	0	0	0	0
P150 April-May Labor	0	0	0	0
P151 Total Annual Labor	0	0	0	0
P152 Livestock Housing	0	0	0	0
P153 Grain Storage	0	0	0	0
P154 Community Pasture Privilege	0	0	0	0
P155 Pasture Supply	-.5	-1	-.5	-.5
P156 Straw Supply	0	0	0	0
P157 Credit Repayment	0	0	0	0
P158 Grain Sales Quota	0	0	0	0

Short Run	-1.75	0	0
Long Run	-1.75	-5	-2.50

Resource Restrictions	Community Pasture Rental P29 Acre	Purchasing Livestock Buildings P30 $100.00	Purchasing Grain Storage P31 100 Bushel
P134 Owned Working Capital	.0175	.05	.025
P135 Owned Investment Capital	0	1.0	.25
P136 Credit Supply Fund	0	0	0
P137 Crop Acres	0	0	0
P138 Tame Grass	0	0	0
P139 Open Pasture, Not Arable	0	0	0
P140 Bush Pasture, Not Arable	0	0	0
P141 Idle Land, Not Arable	0	0	0
P142 Arable Open Pasture	0	0	0
P143 Arable Bush Pasture	0	0	0
P144 Arable Idle Land	0	0	0
P145 Mixed Hay Supply	0	0	0
P146 Native Hay Supply	0	0	0
P147 Wheat Supply	0	0	0
P148 Oats Supply	0	0	0
P149 Barley Supply	0	0	0
P150 April-May Labor	0	0	0
P151 Total Annual Labor	0	0	0
P152 Livestock Housing	0	-1.0	0
P153 Grain Storage	0	0	-1.0
P154 Community Pasture Privilege	1	0	0
P155 Pasture Supply	-1	0	0
P156 Straw Supply	0	0	0
P157 Credit Repayment	0	0	0
P158 Grain Sales Quota	0	0	0

Short Run	-6.0	-6.0	-8
Long Run	-6.0	-6.0	-8

Resource Restrictions	Borrowing For Working Capital P32 $100.00	Borrowing For Investment Capital P33 $100.00	Baling Straw P34 Ton
P134 Owned Working Capital	-1	0	.08
P135 Owned Investment Capital	0	-1	0
P136 Credit Supply Fund	1	1	0
P137 Crop Acres	0	0	0
P138 Tame Grass	0	0	0
P139 Open Pasture, Not Arable	0	0	0
P140 Bush Pasture, Not Arable	0	0	0
P141 Idle Land, Not Arable	0	0	0
P142 Arable Open Pasture	0	0	0
P143 Arable Bush Pasture	0	0	0
P144 Arable Idle Land	0	0	0
P145 Mixed Hay Supply	0	0	0
P146 Native Hay Supply	0	0	0
P147 Wheat Supply	0	0	0
P148 Oats Supply	0	0	0
P149 Barley Supply	0	0	0
P150 April-May Labor	0	0	0
P151 Total Annual Labor	0	0	1.0
P152 Livestock Housing	0	0	0
P153 Grain Storage	0	0	0
P154 Community Pasture Privilege	0	0	0
P155 Pasture Supply	0	0	0
P156 Straw Supply	0	0	-1.0
P157 Credit Repayment	-1.0	-1.0	0
P158 Grain Sales Quota	0	0	0

Short Run	0	0	0	-7.59
Long Run	0	0	0	0

Resource Restrictions	Roughage Substi-tution P35 Tons	Feed Grain Substi-tution P36 Bushel	Capital Substi-tution P37 $100.00	Credit Repay-ment P38 $100.00
P134 Owned Working Capital	0	0	-1	0
P135 Owned Investment Capital	0	0	1	0
P136 Credit Supply Fund	0	0	0	0
P137 Crop Acres	0	0	0	0
P138 Tame Grass	0	0	0	0
P139 Open Pasture, Not Arable	0	0	0	0
P140 Bush Pasture, Not Arable	0	0	0	0
P141 Idle Land, Not Arable	0	0	0	0
P142 Arable Open Pasture	0	0	0	0
P143 Arable Bush Pasture	0	0	0	0
P144 Arable Idle Land	0	0	0	0
P145 Mixed Hay Supply	-.8	0	0	0
P146 Native Hay Supply	1.0	0	0	0
P147 Wheat Supply	0	0	0	0
P148 Oats Supply	0	-1.0	0	0
P149 Barley Supply	0	.69	0	0
P150 April-May Labor	0	0	0	0
P151 Total Annual Labor	0	0	0	0
P152 Livestock Housing	0	0	0	0
P153 Grain Storage	0	0	0	0
P154 Community Pasture Privilege	0	0	0	0
P155 Pasture Supply	0	0	0	0
P156 Straw Supply	0	0	0	0
P157 Credit Repayment	0	0	0	1.0
P158 Grain Sales Quota	0	0	0	0

Short Run	-8	-8	-8
Long Run	-8	-8	-8

Resource Restrictions	Native Hay Bush Pasture - Not Arable P39 Tons	Native Hay -Arable Open Pasture P40 Tons	Native Hay - Arable Bush Pasture P41 Tons
P134 Owned Working Capital	.08	.08	.08
P135 Owned Investment Capital	0	0	0
P136 Credit Supply Fund	0	0	0
P137 Crop Acres	0	0	0
P138 Tame Grass	0	0	0
P139 Open Pasture, Not Arable	0	0	0
P140 Bush Pasture, Not Arable	3.333	0	0
P141 Idle Land, Not Arable	0	0	0
P142 Arable Open Pasture	0	1.66	0
P143 Arable Bush Pasture	0	0	3.33
P144 Arable Idle Land	0	0	0
P145 Mixed Hay Supply	0	0	0
P146 Native Hay Supply	-1.0	-1.0	-1.0
P147 Wheat Supply	0	0	0
P148 Oats Supply	0	0	0
P149 Barley Supply	0	0	0
P150 April-May Labor	0	0	0
P151 Total Annual Labor	0	0	0
P152 Livestock Housing	0	0	0
P153 Grain Storage	0	0	0
P154 Community Pasture Privilege	0	0	0
P155 Pasture Supply	0	0	0
P156 Straw Supply	0	0	0
P157 Credit Repayment	0	0	0
P158 Grain Sales Quota	0	0	0

APPENDIX H

OUTLINE OF PREBUDGETS; DESCRIPTION OF REAL ACTIVITIES

P1 - Rotation #1 Prebudget (Wheat-Fallow) 2 Acres Required:

Gross Income:

22.4 bus/acre x $1.40 =		$31.36

Variable Costs:

(a) Fallow Crop:

Seed - 1.5 bus./acre x $1.65/bus.=	$2.48	
Seed treatment (dual purpose) - 1.5 bus. x 17c/bus.	.26	
Seeding with disker @ 37c/acre -	.37	
Pack & harrow @ 19c/acre (2 oper.)=	.19	
Custom spraying @ 50c/acre (incl. chemical)=	.50	
Swathing @ 25c/acre =	.25	
Custom combining @ $3.00/acre =	3.00	
Hauling & storage costs @ 5c/bus. (farm bin)=	1.12	
Sub-Total		$8.17

(b) Summerfallow:

Cultivator @ 35c/acre =	.35	
Cultivator @ 35c/acre =	.35	
Disker @ 34c/acre =	.34	
Rodweeder @ 17c/acre =	.17	
Rodweeder @ 17c/acre =	.17	
Sub-Total		$1.38

(c) Miscellaneous Costs:

10% x 9.55 =	$0.96	
Total Variable Costs		$10.51
Net Returns Above Variable Costs		$20.85

Per Acre Conversion:

Gross Income/Acre = 31.36 ÷ 2 =	$15.68
Variable Costs/Acre = 10.51 ÷ 2 =	5.26
Net Returns Above Variable Costs =	$10.42

Labor Requirements Per Acre:

For year	1.24 hrs
For April-May	0.74 hrs

P2 - Rotation #2 Prebudget (Wheat - Wheat-Fallow) 3 Acres Required:

Gross Income:

22.4 bus. fallow wheat @ $1.40 =	$31.36	
13.8 bus. stubble wheat @ $1.40 =	19.32	
Total Gross Income		$50.68

Variable Costs:

(a) Fallow Crop:

As in rotation #1		$8.17

(b) Stubble Crop:

Seed - 1.5 bus./acre @ $1.65 =	$ 2.48	
Seed treatment (dual purpose) -1.5 bus. @ 17¢ =	.26	
Fall cultivation with cult. @35¢ ac.=	.35	
Seeding with disker @ 37¢/acre =	.37	
Pack & harrow @ 19¢/acre (2 operations)	.19	
Custom spraying @ 50¢/acre =	.50	
Swathing @ 25¢/acre =	.25	
Custom combining @ $3.00/acre =	3.00	
Hauling and storage @ 5¢/bus.(farm storage)=	.69	
Sub-Total		$8.09

(c) Summerfallow:

As in Rotation #1		$1.38

(d) Miscellaneous Costs:

10% x $17.64		$1.76
Total Variable Costs		$19.40
Net Returns Above Variable Costs		$31.28

Per Acre Conversion:

Gross Income/Acre = 50.68 ÷ 3 =	$16.89
Variable Costs/Acre = 19.40 ÷ 3 =	6.47
Net Returns Above Variable Costs	$10.42

Labor Requirements Per Acre:

For year	1.26 hrs
For April-May	0.70 hrs

P3 - Rotation #3 Prebudget (Wheat - Barley - Fallow) 3 Acres Required:

Gross Income:

22.4 bus. of fallow wheat @ $1.40 =	$31.36	
21.7 bus. of stubble barley @ .81 =	17.58	
Total Gross Income		$48.94

Variable Costs:

(a) Fallow Wheat Crop:

As in rotation #1 =		$8.17

(b) Stubble Barley Crop:

Seed - 2 bus./acre @ $1.00/bus.=	$ 2.00	
Seed treatment (dual purpose)@17¢/bus=	.34	
Fall cultivation with cultivator @ 35¢/acre =	.35	
Seed with disker @ 37¢/acre =	.37	
Pack & Harrow @ 19¢/acre (2 operations)	.19	
Custom spraying @ 50¢/acre =	.50	
Swathing @ 25¢/acre =	.25	
Combining @ 3.00/acre =	3.00	
Hauling & storage @ 5¢/bus.(farm bins)	1.08	
Sub-Total		$8.08

(c) Summerfallow:

As in Rotation #1		$1.38

(d) Miscellaneous Costs:

10% x $17.63	$1.76	
Total Variable Costs		$19.39
Net Returns Above Variable Costs		$29.55

Per Acre Conversion:

Gross Income/Acre = 48.94 ÷ 3 =	$16.31
Variable Cost/Acre = 19.39 ÷ =	6.46
Net Returns Above Variable Costs	$9.85

Labor Requirements Per Acre:

For year	1.26 hrs
For April - May	0.70 hrs

P4 - Rotation #4 Prebudget (Barley - Oats - Fallow):

Gross Income:

31.9 bus. fallow barley @ 81¢ =	$25.83	
29.3 bus. stubble oats @ 56¢ =	16.40	
Total Gross Income		$42.23

Variable Costs:

(a) Fallow Barley Crop:

Seed - 2 bus./acre @ 1.00/bus =	$ 2.00	
Seed treatment @ 17¢/bus. (dual purpose)=	.34	
Seed with disker @ 37¢/acre =	.37	
Packer & Harrows @ 19¢/acre (2 oper).=	.19	
Custom spraying @ 50¢/acre =	.50	
Swathing @ 25¢/acre =	.25	
Custom combining @ $3.00/acre =	3.00	
Hauling & storage @ 5¢/bus. (farm bins)=	1.60	
Sub-Total		$8.25

(b) Stubble Oat Crop:

Seed - 2.5 bus./acre @ 70¢/bus.=	$ 1.75	
Seed treatment @ 17¢/bus. (dual)=	.43	
Preseed with cultivator @ 35¢/acre=	.35	
Seed with disker @ 37¢/acre =	.37	
Packer & harrows @ 19¢/acre (2 oper.)	.19	
Custom spraying @ 50¢/acre	.50	
Swathing @ 25¢/acre	.25	
Custom combining @ $3.00/acre	3.00	
Hauling & storage @ 5¢/bus. (farm bins)	1.47	
Sub-Total		$8.31

(c) Summerfallow:

As in Rotation #1		$1.38

(d) Miscellaneous Costs:

10% x $17.94	$1.79	
Total Variable Costs		$19.73
Net Returns Above Variable Costs		$22.50

Per Acre Conversion:

Gross Income/Acre = 42.23 ÷ 3 =	$14.08
Variable Cost/Acre = 19.73 ÷ 3 =	6.58
Net Returns Above Variable Costs	$ 7.50

Labor Requirements Per Acre:

For year	1.26 hrs
For April - May	0.70 hrs

P5 - Rotation #5 Prebudget (Oats and Brome-Alfalfa, Brome-Alfalfa, Brome-Alfalfa, Brome Alfalfa, Brome-Alfalfa, Fallow)

Gross Income:

29.3 bus. oats @ 56¢ =	$16.40	
Hay value - to be reflected in livestock sales	N.A.	
Gross Income (no grass utilization)		$16.40

Variable Costs:

(a) Establishing Stand:

Seed:		
1.5 bus. oats @ 70¢/acre =	$ 1.05	
8 lbs brome @ 23¢/lb. =	1.84	
1 lb. alfalfa @ 75¢/lb.=	.75	
Preseed with disker @ 37¢/acre =	.37	
Seed with rented drill @ 60¢/ acre (oats)=	.60	
Seed with rented drill @ 60¢/acre (alf-brome)=	.60	
Harrows @ 8¢/acre =	.08	
Swathing @ 25¢/acre =	.25	
Custom combining @ 3.00/acre =	3.00	
Hauling and storage @ 5¢/bus. (farm bins) =	1.47	
Sub-Total		$10.01

(b) Summerfallow:

Fall breaking with spikes @ 90¢/acre	$ 0.90	
Cultivator @ 80¢/acre =	.80	
Disker @ 40¢/acre =	.40	
Disker @ 40¢/acre =	.40	
Cultivator @ 35¢/acre =	.35	
Rodweeder @ 20¢/acre =	.20	
Sub-Total		$ 3.05

(c) Annual Haying and Pasture Costs:

To be charged against livestock and haying activities.

(d) Miscellaneous Costs:

10% x $13.06 =	$ 1.31	
Total Variable Costs		$14.37
Net Returns Above Variable Costs		$ 2.03

Per Acre Conversion:

Gross Income/Acre = 16.40 ÷ 6 =	$ 2.73
Total Variable Costs/Acre = 14.37 ÷ 6 =	2.39
Net Returns Above Variable Costs	$ 0.34

Labor Requirements Per Acre:

For year	0.85 hrs
For April-May	0.46 hrs

P6 - Cow-Calf Prebudget; Selling 400 Lb. Calf off Grass in Sept:

Gross Income:

Gross value of calf - 400 lbs. @ 24.00/cwt. =	$96.00	
less breeding failure & deaths @ 10% =	9.60	
Gross Calf Value/Breeding Cow		$86.40

Variable Costs:

(a) Associated with Cow:

Breeding fees	= $ 6.00	
Salt, minerals, vit. A	= 2.50	
Veterinary and medicine	= 1.50	
Machinery & equip (choring & feed processing)	= 2.00	
Fence and building repairs	= 2.00	
Cow losses @ 2% x $175	= 3.50	
Cow replacement (175 - 154 = 21 ÷ 6)	3.50	
Miscellaneous costs @ 5%	= 1.05	
Sub-Total		$22.05

(b) Associated with Calf:

Marketing costs @ 5.00/head x 90%=	$ 4.50	
Miscellaneous costs (med., vet., minerals) @ $1.65/head x 90% =	1.50	
Sub-Total		$6.00
Total Variable Costs		$28.05

Net Returns Above Variable Costs/Breeding Cow	$58.35
Add Depreciation on Cow 1/	3.50
= Net Returns (Programming for Maximum Family Living Stand.)	$61.85

Miscellaneous Data:

(a) Building Investment/Cow - $36.00

(b) Pasture Requirements/Cow-Calf Unit:

	Tame	Native	Bush
Pasture for cow	1.89	4.71	9.43
Pasture for calf	.51	1.28	2.57
Total	2.4acres	6.0acres	12.0 acres

(c) Labor Requirements/Cow-Calf Unit:
Full year - 25 hours
April - May - 6 hrs.

(d) Feed Requirements (Cow):
1/3 ton bedding
2 tons of mixed hay (approximately ¼ to be legume hay)

(e) Breeding Cow Value - $175.00

1/ - Depreciation applicable to each enterprise was added back to net returns when programming for maximum family living standard.

P7 - Finish Fed Calf Prebudget; Selling Calves at 800 Lbs. from Initial Weight of 400 lbs. over a 190 Day Feeding Period Ending in April:

Gross Income:

Gross value of finished calf - 800 lbs. @ $22.50 =	$180.00	
Less 12% dea th margin (2% on feed) =	21.60	
Gross Finished Calf Value/Breeding Cow		$158.40

Variable Costs:

(a) Associated with Cow	$ 22.05	
(b) Associated with Calf Prior to Feeding	$ 1.50	
(c) Associated with Finishing Period:		
Salt, minerals, vit.A.	=$1.75	
Vet., medicine,implants	= 2.00	
Machinery & equip.use	= 3.25	
Building repairs	= 1.00	
Marketing and trucking	= 8.00	
Miscellaneous costs @ 5%	= .80	
Sub-Total	$16.80x.88 = $14.78	
Total Variable Costs		$ 38.33
Net Returns Above Variable Cost/Breeding Cow		$120.07
Add Depreciation on Cow 1/		3.50
= Net Returns (Programming for Maximum Family Living Standard)		$123.57

Miscellaneous Data:

(a) Building Investment/Cow-Calf - $56.00

(b) Pasture Requirements/Cow-Calf:
As for Cow-Calf-prebudget.

(c) Labor Requirements/Cow-Calf:
Full year - 35 hours
April - May - 10 hours

(d) Feed Requirements/Cow-Calf:

Calf	Cow
.6 ton mixed hay (½ Legume)	2 ton mixed hay
.33 ton straw(bedding)	1/3 ton straw (bedding)
24 bus. barley	
28 bus. oats	

1/ Depreciation applicable to each enterprise was added back to net returns when programming for maximum family Living Standard.

P8 - Yearlings Sold off Grass Prebudget; Yearlings Sold in October at 820 Lbs.

Gross Income:

Gross value of yearling off grass - 820 lbs x $21.50/cwt =	$176.30	
Less breeding failures and deaths @ 13%	22.92	
Gross Yearling Value/Breeding Cow		$153.38

Variable Costs:

(a)	Associated with Cow	=	$22.05
(b)	Associated with Calf Prior to Wintering	=	1.50
(c)	Associated with Wintering Calf:		
	Salt, minerals, vit. A.=	$1.50	
	Veterinary & medicine =	1.50	
	Machinery & equipment use =	1.75	
	Building repairs =	1.00	
	Sub-Total	$5.75 x .88 =	$ 5.06
(d)	Associated with Pasturing:		
	Salt, minerals, vit. A.=	.75	
	Veterinary & medicine =	.75	
	Machinery & equipment use =	.50	
	Marketing & trucking charges=	8.00	
	Sub-Total	$10.00 x .87 =	$ 8.70
	Total Variable Costs		$ 37.31

Net Returns Above Variable Costs/Breeding Cow	$116.07
Add Depreciation on Cow 1/	3.50
Net Returns (Programming for Maximum Family Living Standard)	$119.57

Miscellaneous Data:

(a) Building Investment/Cow-Calf-Yearling: = $56.00

(b) Pasture Requirements/Cow-Calf-Yearling:

	Tame	Native	Bush
Pasture for cow	1.89	4.71	9.43
Pasture for calf	.51	1.28	2.57
Pasture for yearling	1.2	3.0	6.0
	3.6 acres	9.0 acres	18.0 acres

(c) Labor Requirements/Cow-Calf-Yearling:

Full year 33 hours
April - May 8 hours

(d) Feed Requirements/Cow-Calf-Yearling:

Cow	Wintering Calf
2 ton mixed hay	.9 ton mixed hay
1/3 ton straw	16 bus. oats
	¼ ton straw (bedding)

1/ Depreciation applicable to each enterprise was added back to net returns when programming for maximum family living standard.

P9 - Finished Yearlings Off Pasture Prebudget; Commencing on Feed in October at 820 Lbs. for 85 day Feeding Period, Selling at 1,020 Lbs. in January.

Gross Income:

Gross value of finished yearling - 1020 lbs @ $23.00 =	$234.60	
Less breeding failures & deaths @ 14% =	32.84	
Gross Finished Yearling Value/Breeding Cow		$201.76

Variable Costs:

(a)	Associated with Cow	=	$ 22.05
(b)	Associated with Calf on Pasture	=	1.50
(c)	Associated with Wintering Calf	=	5.06
(d)	Associated with Yearling on Pasture	=	0.70

(e) Associated with Yearling on Feed:

Salt and minerals	= $0.65		
Vet., medicine & implants	= 1.25		
Mach. & equipment use	= 2.00		
Building repairs	= .75		
Marketing & trucking	= 10.00		
Sub-Total	$14.65 x	.86=	$ 12.60
Total Variable Costs			$ 41.91

Net Returns Above Variable Costs/Breeding Cow	$159.85
Add Depreciation/Cow 1/	3.50
Net Returns (Programming for Maximum Family Living Standard)	$163.35

Miscellaneous Data:

(a) Building Investment - $70.00

(b) Pasture Requirements:
As for yearlings sold off grass

(c) Labor Requirements:
Full year - 43 hours
April - May - 8 hours

(d) Feed Requirements:

Cow	Wintering Calf	Finished Yearling
2 ton mixed hay	.9 ton mixed hay	.4 ton hay
1/3 ton straw	16 bus. oats	.25 ton bedding
	¼ ton straw (bedding)	20 bus. barley
		9 bus. oats

1/ Depreciation applicable to each enterprise was added back to net returns when programming for maximum family living standard.

P10 -Single Farrowing Hog Prebudget; Farrowing in June for December Marketing.

Gross Income:

Sale of 7 pigs @ 150 lbs. dressed weight @ $23.50/cwt (net price after marketing charges)		$246.75

Variable Costs:

(a) Associated with Sow:

Breeding charges @ $5.00	= $ 5.00	
Sow supplement (40%) - 225 lbs. @ $6.30	= 14.18	
Building and fence repairs	= 4.00	
Machinery & equip. use, fuel, etc.	= 3.00	
Vet., medicine, salt, minerals, etc.	2.50	
Sow losses and replacement above cull sales	= 5.00	
Miscellaneous costs @ 5%	= 1.68	
Sub-Total		$35.36

(b) Associated with Market Hogs:

Hog starter (18%) - 50 lbs. @ $5.30/cwt.	= $ 2.65	
Hog supplement (40%) - 55 lbs. @ $7.00/cwt.	= 3.85	
Building & fence repairs	= .75	
Machinery & equipment use	= 1.00	
Veterinary and medicine	= 1.00	
Miscellaneous costs @ 5%	= .46	
Sub-Total	$9.71 x 7.5 = $72.82	
Total Variable Costs		$108.18
Net Returns Above Variable Costs		$138.57

Miscellaneous Data:

(a) Building Investment - $75.00

(b) Labor Requirements: (20 hrs/sow & weanlings)
Full year - 60 hours 5 hrs/fattening hog)
April - May - 10 hours

(c) Feed Requirements:
Sow - 21 bus. oats
42 bus. barley
Market hogs - 5.8 bus. barley x 7.5 = 43.5 bus. barley/litter
11.3 bus. oats x 7.5 = 84.8 bus. oats/litter
Sow & litter - 1.25 ton straw (bedding)

(d) Sow Replacement Value - $85.00

(e) Price = $24.00/cwt for 5 "B" hogs and $28.50 for 2 "A" hogs; Average of $25.30/cwt.

(f) Marketing charges = $1.40 per hog marketed.

P11 - Double Farrowing Hog Prebudget; Staggered Farrowing.

Gross Income:

Sale of 14 pigs @ 150 lbs. dressed weight @ $23.50 cwt = $493.50
(net price after marketing charges)

Variable Costs:

(a) Associated with Sow:

Breeding charges	=	$4.00	
Sow supplement - 275 lbs. @ $6.30/cwt	=	17.32	
Housing & fence repairs	=	7.50	
Machinery & equipment use	=	4.50	
Vet, medicine, salt, minerals	=	3.50	
Sow losses & replacement above cull sales	=	7.00	
Miscellaneous costs @ 5%	=	2.51	
Sub-Total			$46.33

(b) Associated with Market Hogs:

Hog starter (18%) - 50 lbs @ $5.30/cwt	=	2.65	
Hog supplement (40%) - 55 lbs @ $7.00/cwt	=	3.85	
Building and fence repairs	=	.75	
Machinery & equipment use	=	1.25	
Veterinary & medicine	=	1.00	
Miscellaneous costs @ 5%	=	.48	
Sub-Total		$9.98x15 =	$149.70

Total Variable Costs	$196.03
Net Returns Above Variable Costs	$297.47

Miscellaneous Data:

(a) Building Investment - $180.00

(b) Labor Requirements - Full year - 110 hours (30 hours/sow (5 hours/fattening hog

(c) Feed Requirements:
Sow - 23 bus. oats
50 bus. barley

Market hogs - 5.8 bus. barley x 15 = 87 bus. barley/litter
11.3 bus. oats x 15 - 169.5 bus. oats/litter
Sow & litter - 2.5 ton straw (bedding)

(d) Sow Replacement Value = $85.00

(e) Price - Based on average price for year of $24/cwt for B hogs and $28.50/cwt for A hogs, to give average litter price of $25.30/cwt, basis 2 A hogs and 5 B hogs per litter.

(f) Marketing Charges = $1.40 / hog marketed.

P.12 - Selling Wheat:

Grain storage and hauling charges in prebudgets refer to farm storage and hauling. Custom hauling at 5¢/bus. is assumed for all wheat sold to the elevator. Quota restrictions assumed are 7 bus./cultivated acre.

P.13, P.14 - Selling Oats; Selling Barley:

Custom hauling at 3c/bus. is assumed for oats and barley sold to elevator.

P.15, P.16, P.17 - Clear and Break - Arable Open Pasture, Arable Bush Pasture, and Arable Idle Land:

Charges assumed to be $18.00, $30.00 and $35.00/acre respectively, to put the land in fallow condition. Custom hiring was assumed. Variable interest charge assumed as a borrowing charge. Annual costs assumed to be 40c/acre increased taxes.

P.18 - Rebreaking Tame Grass:

Cost assumed to be $3.05/acre.

P.19 - Clear Bush Pasture, Not Arable:

Cost assumed to be $15.00/acre for clearing only.

P.20, P.21 - Hay Production, Tame Grass; Native Hay Production, Open Pasture, Not Arable:

Cost of custom haying (bales) on tame grass assumed to be $1.00/ton cheaper than haying native grass. Assumed to be $8.00/ton for native grass and $7.00/ton for tame grass.

P.22, P.23, P.24, P.25, P.26, P.27, P.28 - Pasture Supply - Tame Grass, Open Pasture not Arable, Bush Pasture Not Arable, Idle Land Not Arable, Arable Open Pasture, Arable Bush Pasture, Arable Idle Land:

Land assumed to be unfenced and therefore requiring an investment of $4.00 per acre for fencing. This was charged out at 5% for depreciation charges each year. Repairs to the fences were charged as livestock expenses.

Carrying capacity of each pasture was assumed to be in the ratio of 1 acre of tame pasture = 2.5 acres of native pasture = 5 acres of bush pasture. Ar able and non-arable land of the same pasture type were assumed to have equal carrying capacities.

P.29 - Community Pasture Rental:

The charge for community pasture was estimated to be $10.50/cow-calf. Assuming equivalent pasture to open native, then 6 acres were required per cow-calf. This worked out to $\frac{10.50}{6}$ = $1.75/acre

P.30 - Purchasing Livestock Buildings:

An annual charge of $5.00 was assessed for depreciation on needed buildings for livestock. Interest charges were accounted for in borrowing the money, and repairs were charged out as a livestock expense.

P.31 - Purchasing Grain Storage:

Grain storage facilities were assumed available at $25.00 per 100 bushels. Depreciation and repair costs were charged out as an annual cost at 10% per year, (5% for depreciation, 5% for repairs).

P.32, P.33 - Borrowing for Working Capital, Borrowing for Investment Capital:

A given loan fund was assumed available. For each dollar borrowed, a specified amortized payment was transferred into the credit repayment restriction. Interest was not charged at this stage, but was charged out in the credit repayment activity. These activities acted only as transfer activities.

P.34 - Baling Straw:

Straw was assumed available in unlimited supply at $8.00/ton for the cost of custom baling.

P.35 - Roughage Substitution:

The roughage substitution activity was included to allow substitution

of native hay for mixed hay. Substitution was on the basis of value, which was in the ratio of 1 ton of native hay for .8 ton of mixed hay.

P.36 - Feed Grain Substitution:

Oat - barley substitution was incorporated on the basis of .69 bus. of barley for 1 bushel of oats (substitution was based on value).

P.37 - Capital Substitution:

Capital substitution activity was included to insure that no owned investment capital would go unused.

P.38 - Credit Repayment:

Credit repayment activity was incorporated to generate amortized payment, based on term of loan and amount borrowed; amortization was at 6% interest.

P.39, P.40, P.41 - Native Hay Production - Bush PastureNot Arable, Arable Open Pasture, Arable Bush Pasture.

Hay producing activities were incorporated to supplement activities P.20 & 21. Custom work was assumed at $8.00/ton.

APPENDIX I

LINEAR PROGRAMMING RESULTS; FINAL ITERATION

ogram #1 - Average Equity Benchmark Farm: Programmed for Maximum Family Living
andard, Basis 10 Year Debt Repayment: $20,000 Credit Fund:

Activities in Optimum Program:

Activity	Activity Level	Total Variable Cost	Range Over Which Initial Cost Could be Varied with Variable Still Remaining in the Optimum Plan: Lower Limit	Upper Limit
34	27.30	-8.00	-20.80	-6.85
30	13.62	-5.00	-20.17	-3.40
136	89.35	0.0	- .54	3.31
33	110.65	-6.00	-6.00	-5.46
5	87.53	-2.39	-3.78	-1.43
3	128.68	-6.46	-7.07	-6.38
21	0.00	-8.00	-12.09	-6.03
25	26.0	-0.20	-2.10	9999.9
15	29.0	-0.40	-4.71	9999.9
29	180.0	-1.75	-4.60	9999.9
17	10.0	-0.40	-6.04	9999.9
151	388.74	0.0	-0.03	0.24
19	29.0	0.0	-1.23	9999.9
12	1,843.67	1.40	1.38	1.48
37	43.44	0.00	0.00	1.09
20	108.53	-7.00	-8.39	-3.66
150	548.25	0.0	-0.38	1.68
23	103.0	-0.20	-1.38	4.11
153	0.99	0.0	-2.20	4.15
16	41.0	-0.40	-6.12	9999.9
1	78.79	-5.26	-5.33	-4.21
9	32.89	159.35	150.35	170.87
36	395.07	00.0	-.15	.01
38	110.65	00.00	-3.31	.54
158	316.33	0.00	-.08	.02

Program #3 - Low Equity Benchmark Farm; Programmed for Maximum Net Farm Income; No Credit Provision:

A. Activities in Optimum Program:

Activity	Activity Level	Initial Variable Cost	Range Over Which Initial Cost Could be Varied with Variable Still Remaining in Optimum Plan	
			Lower Limit	Upper Limit
P. 34	7.75	-8.00	-13.26	4.08
P. 11	3.10	297.47	290.70	342.95
P. 32	0.0	-6.00	-6.00	9999.90
P. 137	0.55	0.0	-2.10	0.55
P. 36	126.34	0.0	-0.19	0.08
P. 139	60.00	0.0	-1.22	6.52
P. 140	29.00	0.0	-1.37	9999.90
P. 141	21.00	0.0	-1.62	9999.90
P. 142	12.00	0.0	-1.22	9999.90
P. 143	17.00	0.0	-1.37	9999.90
P. 144	17.00	0.0	-1.62	9999.90
P. 22	0.0	-0.20	-3.24	1.09
P. 35	0.0	0.0	-6.91	4.57
P. 12	1000.00	1.40	1.01	1.90
P. 37	15.06	0.0	-3.53	0.0
P. 138	6.00	0.0	-0.80	2.40
P. 150	272.31	0.0	-5.94	1.13
P. 151	1869.76	0.0	-0.79	0.12
P. 152	0.52	0.0	-66.56	8.71
P. 153	3.84	0.0	-18.41	2.68
P. 154	180.00	0.0	-1.70	9999.90
P. 9	0.0	159.85	135.71	164.48
P. 4	48.16	-6.58	-7.13	-2.83
P. 38	0.0	0.0	-37.46	9999.90
P. 1	89.29	-5.26	-5.72	0.29

B. Marginal Value Products of Selected Resource Restrictions:

Resource Restriction	Marginal Value Product	Range in Use Over Which Marginal Value Product Holds Constant	
		Lower Limit	Upper Limit
P. 134	43.46	-0.14	12.50
P. 135	43.46	-0.14	12.50
P. 145	8.64	-5.50	0.0
P. 146	6.91	-6.87	0.0
P. 155	0.81	0.0	15.00

ogram #2 - Average Equity Benchmark Farm; Programmed for Maximum Net Farm Income; $20,000 Credit Fund:

Activities in Optimum Program:

	Activity Level	Initial Variable Cost	Range over Which Initial Cost Could be Varied with Variable Still Remaining in Optimum Plan	
			Lower Limit	Upper Limit
34	23.82	-8.00	-34.63	-4.01
30	10.69	0.0	-31.58	4.73
136	107.52	0.0	-1.07	6.18
33	92.48	-6.00	-6.00	-4.93
5	62.60	-2.39	-5.30	-1.96
23	65.34	0.0	-0.57	0.37
39	8.70	-8.00	-8.95	9999.90
25	26.00	0.0	-0.97	9999.90
15	29.00	-0.40	-4.04	9999.90
3	118.73	-6.46	-6.99	-5.55
17	10.00	-0.40	-3.27	9999.90
151	598.93	0.0	-0.07	0.41
31	0.24	0.0	-7.78	3.34
12	2,160.00	1.40	1.36	9999.90
37	41.32	0.0	0.0	8.62
20	83.60	-7.00	-8.75	-6.57
150	574.34	0.0	-0.57	0.68
29	180.00	-1.75	-2.85	9999.90
35	13.90	0.0	-0.61	2.46
16	41.00	-0.40	-3.67	9999.90
1	113.67	-5.26	-5.47	-4.47
9	28.70	163.35	152.89	166.66
36	412.11	0.0	-0.14	0.09
38	92.48	-7.59	-13.77	-6.52
21	5.20	-8.00	-8.61	-7.05

Marginal Value Products of Selected Resource Restrictions:

	Marginal Value Product	Range in Use Over Which Marginal Value Product Holds Constant	
		Lower Limit	Upper Limit
134	13.59	-41.32	107.52
135	13.59	-92.48	107.52
137	8.80	-7.85	4.00
139	2.52	-222.91	14.07
140	1.26	-38.71	28.15
145	16.60	-9.29	6.76
146	13.28	-11.61	8.45
154	1.10	118.31	14.07
155	3.09	118.31	14.07

Program #4 - Low Equity Benchmark Farm; Programmed for Maximum Net Farm Income; $20,000 Credit Fund:

A. Activities in Optimum Program:

Activity	Activity Level	Initial Variable Cost	Range over Which Initial Cost Could be Varied with Variable Still Remaining in Optimum Plan: Lower Limit	Upper Limit
P. 34	25.78	-8.00	-9.15	0.48
P. 36	139.46	0.0	-0.15	0.01
P. 136	78.52	0.0	-6.00	0.31
P. 30	15.64	-5.00	-6.37	6.30
P. 5	93.48	-2.39	-2.52	0.06
P. 23	89.00	-0.20	-0.31	9999.90
P. 153	4.75	0.0	-2.56	4.15
P. 25	21.00	-0.20	-1.70	9999.90
P. 15	12.00	-0.40	-6.56	9999.90
P. 16	17.00	-0.40	-7.62	9999.90
P. 17	17.00	-0.40	-7.50	9999.90
P. 19	29.00	0.0	-0.88	9999.90
P. 35	0.0	0.0	-14.05	0.18
P. 12	537.98	1.40	1.22	1.41
P. 32	34.96	-6.00	-6.00	0.0
P. 20	102.48	-7.00	-7.13	-0.55
P. 150	45.19	0.0	-3.60	0.16
P. 151	634.98	0.0	-0.38	0.02
P. 33	86.52	-6.00	-6.34	-6.00
P. 29	180.00	-1.75	-3.80	9999.90
P. 3	72.02	-6.46	-7.07	-6.39
P. 9	31.06	159.85	158.89	181.14
P. 4	18.50	-6.58	-6.73	-5.11
P. 38	121.48	0.0	-0.31	6.00
P. 158	784.02	0.0	-0.01	0.18

B. Marginal Value Products of Selected Resource Restrictions:

Resource Restriction	Marginal Value Product	Range in Use Over Which Marginal Value Product Holds Constant: Lower Limit	Upper Limit
P. 134	6.00	-34.96	78.52
P. 135	6.00	-86.52	78.52
P. 137	11.12	-25.95	20.02
P. 139	3.45	-12.31	33.77
P. 140	2.55	-31.96	29.00
P. 145	17.56	-48.57	16.21
P. 146	14.05	-60.71	0.0
P. 154	2.05	-31.96	33.77
P. 155	3.90	-31.96	33.77

Program #5 - High Equity Bench-mark Farm; Programmed for Maximum Net Farm Income; No Credit Provision:

A. Activities in Optimum Program:

Activity	Activity Level	Initial Variable Cost	Range Over Which Initial Cost Could be Varied with Variable Still Remaining in Optimum Plan	
			Lower Limit	Upper Limit
P. 34	15.77	-8.00	-27.60	2.95
P. 1	160.71	-5.26	-5.41	-4.12
P. 32	0.0	-6.00	-6.00	9999.90
P. 152	0.64	0.0	-18.33	32.03
P. 36	182.48	0.0	-0.32	0.02
P. 139	0.03	0.0	-1.16	0.0
P. 140	39.00	0.0	-0.57	9999.90
P. 141	27.00	0.0	-0.83	9999.90
P. 142	44.00	0.0	0.0	9999.90
P. 143	71.00	0.0	-0.57	9999.90
P. 144	5.00	0.0	-0.83	9999.90
P. 22	2.71	-0.20	-2.07	2.42
P. 35	0.0	0.0	-8.88	1.91
P. 12	1800.0	1.40	1.05	1.50
P. 37	27.99	0.0	-14.05	0.0
P. 20	25.94	-7.00	-8.74	-1.64
P. 150	132.91	0.0	-3.72	2.45
P. 151	1276.76	0.0	-0.34	0.45
P. 11	3.70	297.47	271.94	312.58
P. 153	4.21	0.0	-4.86	10.66
P. 154	180.00	0.0	-0.70	9999.90
P. 9	7.86	159.85	154.09	177.54
P. 4	74.29	-6.58	-6.88	-5.28
P. 38	0.0	0.0	-28.80	9999.90
P. 23	63.97	-0.20	-0.20	0.96

B. Marginal Value Products of Selected Resource Restrictions:

Resource Restriction	Marginal Value Product	Range in Use Over Which Marginal Value Product Holds Constant	
		Lower Limit	Upper Limit
P. 134	34.80	-0.01	11.33
P.135	34.80	-0.01	11.33
P. 137	2.25	-9.15	0.02
P. 145	11.10	-30.30	0.03
P. 146	8.88	-37.88	0.0
P. 155	1.66	-75.28	0.04

Program #6 - High Equity Bench-mark Farm; Programmed for Maximum Net Farm Income; $20,000 Credit Fund:

A. Activities in Optimum Program:

Activity	Activity Level	Initial Variable Cost	Range Over Which Initial Cost Could be Varied with Variable Still Remaining in Optimum Plan	
			Lower Limit	Upper Limit
P. 34	27.34	-8.00	-22.93	-4.68
P. 30	10.26	-5.00	-22.70	-0.39
P. 136	89.74	0.0	-1.47	3.63
P. 33	110.26	-6.00	-6.00	-4.53
P. 5	78.72	-2.39	-4.02	-1.68
P. 16	71.00	-0.40	-5.64	9999.90
P. 21	0.0	-8.00	-12.16	-5.71
P. 25	27.00	-0.20	-2.12	9999.90
P. 15	44.00	-0.40	-4.21	9999.90
P. 3	133.08	-6.46	-7.09	-6.24
P. 17	5.00	-0.40	-5.56	9999.90
P. 31	2.08	-2.50	-19.90	1.65
P. 19	39.00	0.0	-1.25	9999.90
P. 12	2598.04	1.40	1.34	1.52
P. 37	47.37	0.0	0.0	3.12
P. 20	108.72	-7.00	- 8.63	-4.30
P. 150	501.11	0.0	-1.10	2.14
P. 23	103.00	-0.20	-1.58	3.61
P. 151	300.47	0.0	-0.07	0.28
P. 29	180.00	-1.75	-4.64	9999.90
P. 1	143.21	-5.26	-5.36	-4.19
P. 9	32.94	159.85	150.75	168.75
P. 36	439.49	0.0	-0.15	0.04
P. 38	110.26	0.0	-3.63	1.47
P. 158	41.96	0.0	-0.12	0.06

B. Marginal Value Products of Selected Resource Restrictions:

Resource Restriction	Marginal Value Product	Range in Use Over Which Marginal Value Product Holds Constant	
		Lower Limit	Upper Limit
P. 134	6.00	-47.37	89.74
P. 135	6.00	-110.26	89.74
P. 137	9.61	-3.75	18.60
P. 139	4.29	-55.52	7.49
P. 140	3.39	-55.52	7.49
P. 145	16.68	-4.43	26.20
P. 146	15.63	0.0	4.49
P. 154	2.89	-55.52	7.49
P. 155	4.74	-55.52	7.49