STAFF STUDY No. 11

Changes in Agriculture to 1970

by John Dawson

prepared for the
Economic Council of Canada

CHANGES IN AGRICULTURE TO 1970

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CHANGES IN AGRICULTURE TO 1970

The main purpose of this paper is to provide perspective on the nature of the adjustments that are in prospect for agriculture during the next few years. In general, the consideration of changes is set in a context of trends during the post-war period. During this period, agriculture in Canada has been in the throes of a technological revolution. The pace of technological change was particularly rapid during the first post-war decade, but changes continued to take place after the mid-1950's even though the rate of increase in the demand for Canadian farm products had lessened. In the next few years there is not likely to be any strong upsurge in the demand for farm products although it may be possible to develop new export outlets in some of the less developed countries which could bear fruit in the longer run. In the years immediately ahead, however, many exciting changes will continue to occur in the techniques and organization of agricultural production, and the efficiency of the agricultural production plant will continue to increase. Since the end of the war, the rapid rate of transformation of agriculture has resulted in the agricultural labour force dropping in 1963 to an average of 655,000; that is, just over half what it was in 1946. It now represents less than one tenth of the total labour force as compared with one quarter of the total at the end of the war. It will likely decline a further 15 per cent by 1970, or to about 7 per cent of the total.

The analysis of changes to 1970 proceeds through the following stages. We first examine briefly the potential increase in demand for Canadian farm products and indicate the magnitude of over-all increases in agricultural production that will likely occur. We then outline the past trends in the rise of inputs, discuss briefly the organization of agricultural production and refer to some of the major technological changes that have been taking place. With this background we move in the last section to a treatment of the nature of the changes that appear to be in store for agriculture by 1970. The paper gives little attention to regional and commodity considerations. The purpose is to gain a general view of the changes in Canadian agriculture. This general review should, however, provide a useful context in which to give detailed consideration to the important regional and commodity aspects of Canadian agriculture.

I - THE DEMAND FOR CANADIAN AGRICULTURAL PRODUCTS

While there has been little empirical analysis of the various factors which influence the demand for Canadian agricultural products, we do know that the growth in the quantity and value of agricultural products is associated with increases in the Canadian population and in their incomes; with the allocation of the increased incomes between food and nonfood items and between domestic and imported food; and with developments in export markets for Canadian farm products.

We turn first to a consideration of the domestic demand for food products of agricultural origin and then to a brief assessment of export demands. For many years the domestic market has provided the main outlet for agricultural products, although in some fields of agricultural production, notably grains, Canada has always had substantial exports. During the 1950's a rising proportion of the slowly increasing production of Canadian farms was being used domestically. Exports have been at a somewhat higher level during the early 1960's, particularly in 1963 and 1964. In relation to the total value of agricultural production in Canada, in the period 1956-60, exports averaged 32 per cent; imports, 7 per cent; and domestic disappearance, 75 per cent.

Domestic Demand for Food

In considering the domestic demand for food, it is useful to distinguish three different concepts. One measure is the quantity of food consumed, usually measured in pounds, but also frequently measured in calories. In terms of the total number of pounds of food consumed per capita, it has changed only slightly in Canada in recent years and is not influenced to any degree by increases in income or changes in tastes. Shifts in the types of food consumed have relatively little effect on the total number of pounds consumed per capita. In relatively wealthy countries such as Canada, we are running into the limits of the human stomach. A second measure of the quantity of food demanded is the farm value of food for the domestic market. As incomes of consumers increase, there is some tendency to increase the amount of food demanded per capita as measured in value at the farm; this increase is caused mainly by the shift to more expensive foods such as meat. A third measure is the quantity of food demanded in terms of expenditures at the retail level; at this level marketing services are associated with the agricultural products, and in countries such as Canada and the United States they account for more than half of what the consumer pays for food at the retail level. Increases in per capita incomes have more effect on expenditures at retail than at the farm level.

Demand at the Retail Level

Changes in demand at the retail level are considered first. Currently, Canadians are committing about 21 per cent of their personal disposable income to food, or about 23 per cent of their expenditures on all goods and services. In the 1963 total of $6.3 billion of consumer expenditure on food there is included food of nonfarm origin and imported food, in addition to that which originates on Canadian farms.[1/]

As population and incomes per capita increase, what will be the effect on total personal expenditure on food in Canada? Before we can deal with this question we need an estimate of the effect of per capita income increases on per capita food expenditures; i.e., the income elasticity of the demand for food at retail. It is generally recognized that, as incomes rise, families spend proportionately less of their total incomes on food and more on other things. To put it another way, one can say that the percentage increase in food expenditure will be less than the percentage increase in family income. We will assume that a 0.6 per cent increase in per capita food expenditure is associated with a 1.0 per cent increase in per capita disposable income. This assumption is based on an examination of changes in food expenditure per capita in relation to personal disposable income per capita for the years 1948 to 1963, both measured in constant dollars.[2/]

In the First Annual Review of the Economic Council, increases in population and potential output are projected to 1970. The average annual rate of increase from the actual level of output in 1963 to potential output in 1970 has been estimated at 5.5 per cent in real terms. The associated average annual rate of growth in personal disposable income is 5.1 per cent, or 41 per cent over the period. (See Chapter 4 of the Council's Annual Review.) With the projected population increase of 15 per cent, a 23 per cent increase in per capita disposable income is obtained. Coupling this projection of per capita disposable income with an estimate of 0.6 for the income elasticity of demand for food at retail, we obtain an increase in per capita personal expenditure on food from $332 in 1963 to $378 in 1970 (in 1963 dollars). In terms of total personal expenditure on food, the increase would be from $6.3 billion to $8.2 billion,

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1/ This total does not include agricultural products which are used in forms other than food.

2/ This is an area in which thorough analysis of Canadian data is needed. In D. L. MacFarlane and J.D. Black, The Development of Canadian Agriculture to 1970, Montreal, 1958: Macdonald College, an elasticity coefficient of 0.4 was used. F. Shefrin and M. W. Menzies, in "Demand Outlook for Canadian Agriculture", a background paper for the 1961 Resources for Tomorrow Conference, Vol. I, Montreal: Queen's Printer, Ottawa, make use of projections of the Royal Commission on Canada's Economic Prospects, 1957, which imply a much higher income elasticity (apparently close to 0.9). See D. W. Slater, Consumption Expenditures in Canada, Queen's Printer, Ottawa, 1957.

an increase of 31 per cent over the period, or an average rate of increase of 3.9 per cent per year. This over-all increase in food expenditure can be attributed almost equally to increases in population and in income. With this projection, and unchanged relative prices of food and nonfood items, food expenditures as a percentage of personal disposable income would decline from the level of 21.0 per cent in 1963 to 19.5 per cent in 1970.

Expenditure at the retail level includes both domestic and imported foods, as well as the services added in the marketing process. As has been mentioned previously, increases do not take place to any substantial extent because of a greater per capita consumption in terms of total pounds of food, but rather involve shifts to more expensive foods both with respect to the food items themselves and in the services that are associated with these items. The types of changes that take place in per capita consumption of various types of food are illustrated by the comparison of consumption patterns between 1951-53 and 1961-63 in Table 1. This comparison of per capita consumption of various foods between the two periods indicates the type of shifts that take place as

Table 1

Per Capita Consumption of Food of Agricultural Origin,

1951-53 and 1961-63

Item	Unit	Annual Averages 1951-53	Annual Averages 1961-63	Increase or Decrease	
		(Pounds)		(Pounds)	(Per cent)
Cereals	Retail weight	167.1	153.0	-14.1	- 8
Pulses and nuts	" "	11.4	9.6	- 1.8	-16
Sugar and syrups	" "	105.7	108.5	+ 2.8	+ 3
Oils and fats (Excluding butter)	" "	27.3	32.0	+ 4.7	+17
Butter	" "	21.4	17.8	- 3.6	-17
Other dairy products	Milk solids	64.0	61.2	- 2.8	- 4
Fruit	Fresh equivalent	164.3	167.9	+ 3.6	+ 2
Vegetables(1)	" "	134.1	174.2	+40.1	+30
Potatoes	" "	149.2	157.2	+ 8.0	+ 5
Meats	Carcass weight	136.3	140.0	+ 3.7	+ 3
Poultry	Eviscerated weight	22.8	31.6	+ 8.8	+39
Eggs	Fresh egg equivalent	34.3	33.3	- 1.0	- 3
Total(1)		1,037.9	1,086.3	+48.8	+ 5

(1) The inclusion of a number of additional items in the vegetable category would account for some of the increase over the period, perhaps of the order of 25 pounds per capita.

Source: Based on data from Dominion Bureau of Statistics.

food expenditures per capita rise with increased incomes. Some of the shifts are affected also by changing price relationships and other factors, such as changing techniques of food processing. One of the examples of the effect of changes in methods of processing a raw food product is potatoes where a whole new range of methods, including instant mashed potatoes, has apparently been effective in arresting the downward trend in per capita consumption. These shifts in per capita consumption are indicative of the continuing changes that are called for in the production of agricultural products for the domestic market. It is generally accepted that increased emphasis on livestock and fruit and vegetable production, relative to cereals, will continue to be required to meet the changing demands for final products in the domestic market.

In the case of meat and dairy products, as well as in some of the other food groups, there have been substantial changes in the per capita consumption of individual items. In Table 2 we show a breakdown of the average per capita consumption of individual items in these two groups. The main factor in the consumption of meats (other than poultry) that has occurred over the decade is the increase in beef consumption,

Table 2

Per Capita Consumption of Meat and Dairy Products,

1951-53 and 1961-63

Item	Unit	Annual Averages 1951-53	Annual Averages 1961-63
		(Pounds)	
Meats, total	Carcass weight	136.3	140.0
Beef and veal	" "	58.5	77.6
Pork	" "	62.9	50.1
Mutton and lamb	" "	2.3	3.8
Other	" "	12.6	8.5
Dairy products, total	Retail weight	495.9	413.9
Fluid milk and cream	" "	409.9	327.6
Butter	" "	21.4	17.8
Cheese(1)	" "	6.7	8.3
Milk in ice cream	" "	32.9	30.3
Skim milk powder	" "	3.9	7.9
Evaporated whole milk	" "	18.3	17.5
Other dairy products	" "	2.9	4.5

(1) Process cheese is included in terms of its cheddar equivalent.

Source: Based on data from Dominion Bureau of Statistics.

part of which has been a substitution for pork. In the case of dairy products, there has been a decline in per capita consumption of fluid milk and cream and an increase in the consumption of skim milk powder. Per capita butter consumption has declined, although it was increasing during the 1961-63 period.

Demand at the Farm Level

We now look at the increases that may be expected in the total farm value of food for the domestic market. Studies in the United States indicate an income elasticity of demand at the farm level about one half of what it is at the consumer level.[1/] The difference is attributable to the higher relative effect of increases in income on expenditures for marketing services than on the products as sold by the farmer. In dealing with the demand for food at the retail level, it was assumed that the income elasticity was 0.6. We will use a value of 0.3 at the farm in our projections here. This percentage change in expenditures at the farm level in relation to a 1.0 per cent change in income would appear to be reasonable in relation to a value of 0.6 at the retail level.[2/]

The potential increase in domestic demand for farm products at the farm level between 1963 and 1970 will be determined mainly by the increase in population, estimated at 15 per cent, the potential increase in personal disposable income, estimated at 23 per cent on a per capita basis, and the income elasticity of demand at the farm level, which is assumed to be 0.3. Taking account of these factors the indicated increase in potential domestic demand for Canadian farm products is about 23 per cent, or an annual average increase of 3.0 per cent.[3/] Because of the low elasticity of demand at the farm

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1/ "The Long-Run Demand for Farm Products", R. F. Daly, in Agricultural Economics Research, United States Department of Agriculture, Vol. VIII, No. 3, July, 1956. MacFarlane and Black, op. cit., used 0.4 at retail and 0.25 at the farm level.

2/ The income elasticity of demand at retail is the weighted average of the elasticities of the two components, with the weights being the relative importance of the two components. Since the weight of the farm component is about 0.4 and the marketing services component about 0.6, the implied elasticity of demand for marketing services is 0.8. This does not appear unreasonable.

3/ By gauging the effect of income on the market for food from Canadian farms in this way, we have implicitly assumed that there is no differential income effect as between foods of domestic and imported origin. If the income effect is greater for imported than for domestic foods, we have over-estimated the increase in potential domestic demand for Canadian farm products. The degree of over-estimate, however, would not be great because imports are only equivalent to about 10 per cent of the food sold by Canadian farmers for domestic consumption. MacFarlane and Black's estimate, op. cit., for the period 1955 to 1970 was for an increase in domestic expenditures on farm products of 49 per cent, or 2.7 per cent per annum.

level, the increase in population is the dominant factor, accounting for about two thirds of the increase.

Export Demand

The other major element in the demand for Canadian agricultural products is the export market. Here we get into an area of much greater uncertainty. The whole question of Canada's international trading relationships is involved. The potential for Canadian exports of agricultural products is affected by the trade policies of other nations, as well as that of Canada, and by arrangements for the noncommercial utilization of food in the less developed countries.

The prospects for exports of Canadian agricultural products to 1970, under conditions of moderately high rates of growth in the economies of our major customers, are reviewed in an Economic Council staff study.[1/] The over-all indication is that commercial exports of agricultural products could increase slightly from the relatively high 1963 level. While there may be substantial longer term market prospects in the less developed countries as incomes rise, it is clear that there are limited prospects for substantial increases in exports to these countries by 1970 on a commercial basis. Wheat exports may not quite reach the amount exported in 1963, but other grains exports may be higher. Thus, the over-all export of grains in an average year around 1970 is expected to be close to the 1963 level. Under favourable demand conditions, increases could be expected for some other agricultural products, with the result that the over-all export of agricultural products could increase by about 10 per cent.

Total Demand for Canadian Agricultural Products

An increase in agricultural exports of this magnitude, coupled with the projected potential increase of 23 per cent in domestic demand, suggests an increase in total demand for Canadian agricultural products of about 20 per cent, or an average annual increase of about 2.5 per cent. An increase in demand at this rate would be slightly greater than that which has occurred over the post-war period. Between the early post-war years and 1963, the volume of farm products sold by Canadian farmers increased at an average annual rate of about 2 per cent. In Chart 1, we show these past

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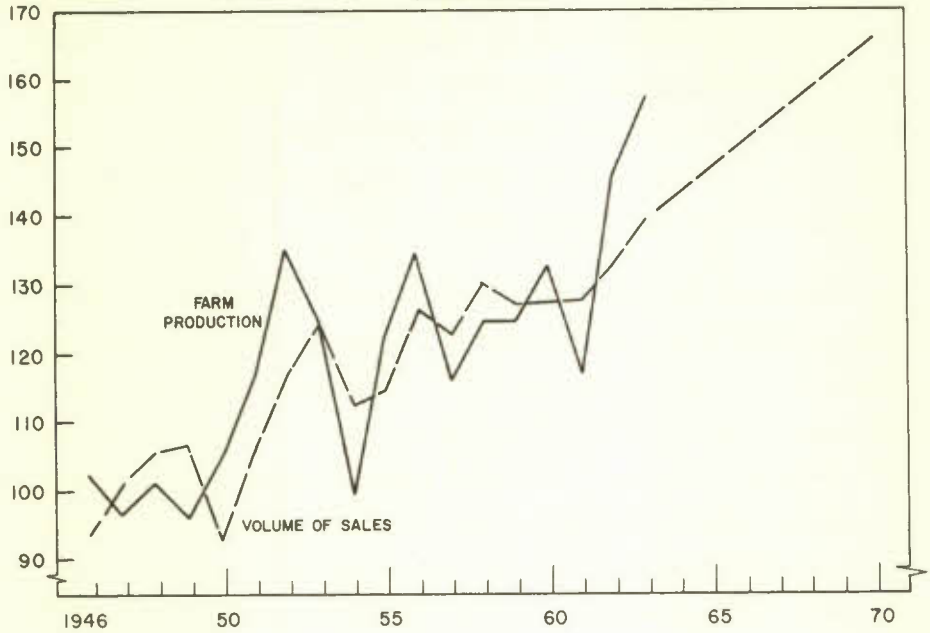
1/ J. R. Downs, "Export Projections to 1970", Staff Study No. 8, Economic Council of Canada, Ottawa: Queen's Printer, 1964.

trends in the volume of farm products sold, as indicated by cash farm income deflated by farm prices, and we also show the projected increase to 1970.

CHART I

VOLUME OF FARM PRODUCTS PRODUCED AND SOLD

(1946-48=100)



Note: Volume of Sales was obtained by deflating cash income from farming operations by the index of farm prices of agricultural products.

Source: Based on data from Dominion Bureau of Statistics and estimates by Economic Council of Canada.

The changing level of farm production is also indicated in Chart 1.[1/] Both the production and volume of sales have been shown in relation to their 1946-48 average levels. During this period the quantity of farm products sold was in approximate balance with the amount produced. It appears also that the 1958-60 period was one of approximate balance. There was little change in the carry-over of grains during either of the periods. In the later period the balance entailed some accumulation of butter stocks but the amount accumulated was not substantial in relation to the total production of agricultural products. The period 1961-63 was probably one of moderate excess

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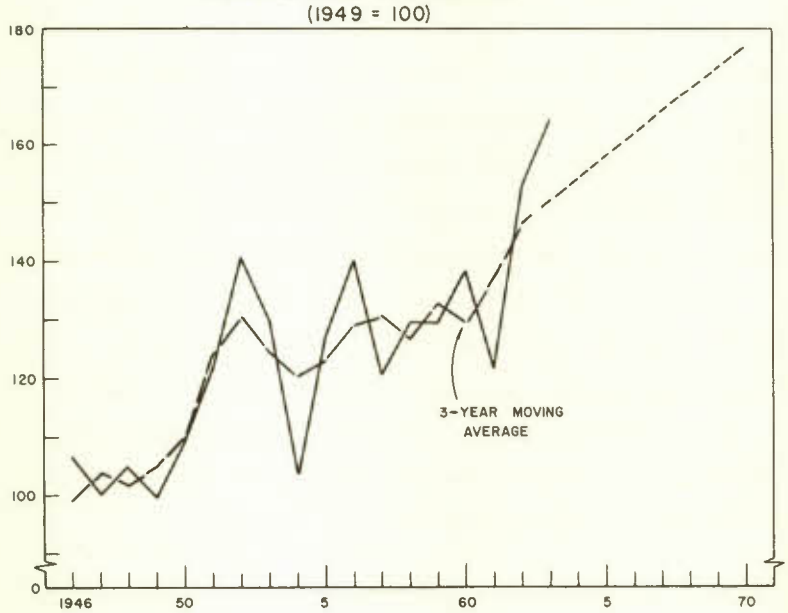
1/ In this study, agricultural production changes are measured by the Dominion Bureau of Statistics Index of the Physical Volume of Agricultural Production. It includes production associated with inputs which are purchased from other sectors of the economy. The DBS Quantity Indexes of Gross Domestic Product at Factor Cost, by Industry of Origin, provide a measure of production change in agriculture which excludes the production associated with purchased inputs. It is this latter measure which is used in B. J. Drabble, "Potential Output, 1946 to 1970", Staff Study No.2, Economic Council of Canada, Ottawa: Queen's Printer, 1964.

production but with much greater year-to-year variations. In Chart 2 the changes in production over the post-war period are shown in relation to the conventional 1949 base. The trend in production is indicated by the three-year moving average. We have projected an increase in production to 1970 of about 20 per cent over the 1961-63 average level. This is consistent with the projected increase in demand and, on this basis, production and the quantity sold would be in balance in 1970. In comparison with 1963, however, the increase in production called for is substantially less — about 1 per cent per annum — because 1963 was a year of record agricultural production.

CHART 2

INDEX NUMBERS OF THE PHYSICAL VOLUME OF AGRICULTURAL PRODUCTION

(1949 = 100)



Note: In other staff studies the index of Gross Domestic Product at factor cost is used to indicate trends in the output of agriculture and other industries. Here we use the index of the physical volume of agricultural production. The main difference is that the index of Gross Domestic Product measures only the contribution to output of factors employed in agriculture whereas the latter index measures the total physical volume of agricultural production. The rate of increase in the physical volume has been greater than the rate of increase in Gross Domestic Product of agriculture since agriculture has been using increasing amounts of inputs from other sectors of the economy. We use the index of physical volume of agricultural production here because the measure of total inputs which we show in Chart 3 includes inputs purchased from other sectors of the economy.

Source: Based on data from Dominion Bureau of Statistics and estimates by Economic Council of Canada.

II - CHANGES IN THE USE OF PRODUCTIVE RESOURCES IN AGRICULTURE

In the previous section the magnitude of the changes in output of Canadian farm products to 1970 in a situation of relatively high domestic and world economic activity were outlined. In this section our concern will be with the changes in the use of productive resources that have taken place in Canadian agriculture over the post-war period during which we have witnessed the occurrence of rapid technological change throughout agriculture. First, the changes in total inputs and in the relative amounts of the different resources used in farm production are summarized. Then, Section III covers the organization of the units of production in agriculture and consideration is given to some of the changes that have been taking place in the size and scale of farm operations.

Annual estimates of the total value of inputs in Canadian agriculture were developed for the period 1926-57 by S. H. Lok, by estimating the constant dollar value of the various inputs.[1/] Lok estimated the annual service costs of providing each of the input groups, including capital, labour and purchased goods and services, and then conducted an extensive analysis of the effect of various weighting periods in aggregating the inputs to obtain total input measurements. The estimates have been extended to 1960 by I. F. Furniss.[2/] In the latter work, 1958 was used for the weighting period.[3/] All of the estimates, except those using a 1935-39 weight period, indicate a decline in total productive inputs in agriculture throughout most of the post-war period. The estimates by Furniss indicate a decline of 11 per cent between 1945-49 and 1960. With the substantial increase in output that has occurred, the over-all productivity in agriculture has thus increased considerably.

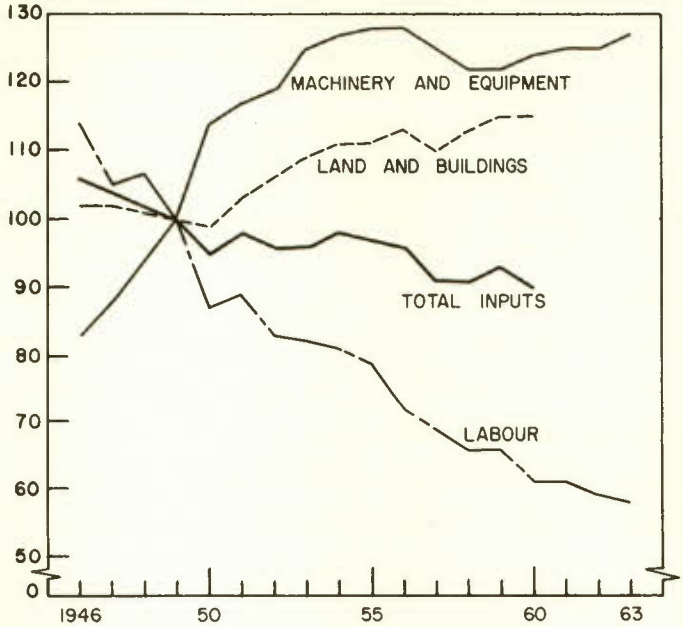
The decline in total inputs and the changes in the three major input items — labour, real estate, and machinery and equipment — are illustrated in Chart 3, using Furniss' data for the period 1946 to 1960. Agricultural labour, the largest input, declined by 39 per cent from 1949 to 1960, and has continued to decline. Real estate increased by 15 per cent, and the input of farm machinery and equipment by 24 per cent to 1960, with a slight increase since then. All the measures are in constant dollars.

1/ S. H. Lok, An Enquiry into the Relationships Between Changes in Over-all Productivity and Real Net Return per Farm, and Between Changes in Total Output and Real Gross Return, Canadian Agriculture, 1926-1957. Economics Division, Canada Department of Agriculture, October 1961.

2/ I. F. Furniss, "Productivity of Canadian Agriculture, 1935-60: A Quarter Century of Change", Canadian Journal of Agricultural Economics, Vol. XII, No. 2, 1964.

3/ This would likely tend to over-estimate the decrease in total inputs as compared with measures using earlier weighting periods, although Lok demonstrates that one cannot be sure that this will be the direction of the bias.

CHART 3
LABOUR, CAPITAL, AND TOTAL INPUTS USED FOR AGRICULTURAL PRODUCTION
(1949 = 100)



Note: Index of total inputs is calculated on 1958 weight base. For the years 1946-60 the labour input is based on estimates for a week in June, while for the years 1961-63, annual averages have been used.

Source: 1946 to 1960, studies of Economics Division, Department of Agriculture, and estimates by Economic Council of Canada.

These changes have resulted in a considerable shift in the relative importance of the various inputs. The distribution by input groups over the period 1935 to 1963 is provided in Table 3. Using 1958 weights, agricultural labour, which even as late as the early post-war years represented over half of the total input in Canadian agricultural production, had dropped to 35 per cent by 1960-63, while machinery and equipment had increased to a point at which it accounted for almost as much of total inputs as real estate. All of the remaining inputs, most of which are purchased on an annual basis by farmers, have increased in relative importance.

Table 3

Distribution of Input Groups,

1935 to 1963

(Per cent of total inputs based on constant dollar data with 1958 weights)

Period	Labour	Real Estate	Machinery and Equipment(1)	Purchased Feed and Seed	Fertilizer and Lime	Miscellaneous
1935-39	63	21	8	3	-	5
1940-44	58	20	11	5	1	5
1945-49	53	19	14	7	1	6
1950-54	45	21	20	6	1	7
1955-59	39	23	21	8	2	7
1960-63	35	24	22	8	2	9

(1) Includes fuel and other purchased items associated with machinery and equipment operation.

Source: I. F. Furniss, op. cit., and estimates provided by the Economics Division of the Canada Department of Agriculture.

III - THE ORGANIZATION OF AGRICULTURAL PRODUCTION

The trends in the relative importance of various inputs used in agricultural production are associated with changes in the over-all organization and scale of farm operation. In this section we outline some of the changes that have been occurring in the organization of the industry.

The number of farms increased in each census period up to a peak level of 733,000 units in 1941. Since then, the number has declined, and in 1961 the Census enumerated 481,000 farms.[1] The total area in farms also reached a peak in 1941, but has remained relatively stable since then, at about 173 million acres. Abandonment in the Atlantic and Central regions has been balanced by increases in the Prairie region. There has been, however, an increase in the proportion of farm land that is improved;[2] the improved acreage increased from 92 million acres in 1941 to 97 million acres in 1951 and 103 million acres in 1961. Taking improved land as a measure of the input of land in agricultural production, there was an increase of 7 per cent from 1951 to 1961, with decreases of 22 per cent and 8 per cent, respectively, in the Atlantic Provinces and the Central Provinces, and increases of 12 per cent in the Prairie Provinces and 13 per cent in British Columbia. In the Prairie Provinces, the increase was to 80.4 million acres, or to 80 per cent of the total.

In the Censuses of 1951 and 1961, farms were classified according to the value of products sold. In Table 4, a breakdown is provided using this economic classification. The table is set up here in a manner that will facilitate our later analysis of the relationship of the agricultural labour force to the number of farms. At this point it is sufficient to note that there has been a shift up the scale in terms of value of products sold. Farms at the lower end of the scale have been abandoned or amalgamated with other farms, or have increased their sales of farm products.[3]

1/ See footnote to Table 4.

2/ The area of improved land consists of the area under crops, improved pasture, summerfallow and the area in farmsteads.

3/ The increased farm sales are not the result of price increases. Farm prices of agricultural products were 8 per cent lower in 1960-61 than in 1950-51.

Table 4

Economic Classification of Farms,

Censuses of 1951 and 1961

Class of Farm	1951	1961	Absolute Change	Percentage Change
Total number of farms	623,091	480,903(1)	-142,188	- 22.8
Residential farms (Value of products sold less than $250)	87,057	43,850(1)	- 43,207	- 49.6
Part-time farms (With sales of $250-$1,199)	65,135	37,645	- 27,490	- 42.2
Total number of farms, other than part-time or residential farms	470,899	399,408	- 71,491	- 15.2
Value of Products Sold:				
$ 250—1,199	83,827	45,301	- 38,526	- 46.0
1,200—2,499	151,290	94,256	- 57,034	- 37.7
2,500—3,749	91,666	69,023	- 22,643	- 24.7
3,750—4,999	53,162	49,754	- 3,408	- 6.4
5,000—9,999	69,019	90,419	+ 21,400	+ 31.0
10,000-14,999	12,594	25,923	+ 13,329	+105.8
15,000 or over	8,649	23,918	+ 15,269	+176.5
Institutional farms	692	814	+ 122	+ 17.6

(1) In the Census, it is estimated that there would have been 40,731 more farms enumerated in 1961 if the 1951 definition of a farm had been used. The 1961 definition was more restrictive mainly for the "3-acre or more" size group because a minimum of $50 sales of agricultural products was required in the 1961 Census, whereas in 1956 and 1951, no minimum production or sales level was required (in addition to the minimum size limit of 3 acres). In terms of the economic classification of farms, which is presented here, the effect would presumably be limited to the Residential farm class, which is the only group with sales of less than $250 reported. The number of farms in this class may, therefore, have declined only slightly since 1951.

Source: Dominion Bureau of Statistics Census of Canada, Agriculture, 1951 and 1961, Ottawa: Queen's Printer.

Farm businesses, with increased acreage and higher value of sales per farm, have increased requirements per farm for capital. The requirements for capital can be related roughly to size of farm by taking the 1961 Census information on total capital investment in real estate, machinery and equipment, and livestock and poultry in relation to the value of sales per farm. Farms with sales from $1,200-$2,499 usually had $14,950-$24,949 invested in capital in these categories. For groups with sales of $3,750-$4,999, the amount invested is usually from $24,950-$49,949; for groups with sales of $10,000-$24,999, the amount invested typically exceeds $49,950; and for farms with $25,000 and over in sales, $99,950 or more is the normal requirement. Canadian agriculture in common with most of

the resource-based industries in Canada, is relatively capital intensive, requiring a large amount of capital in relation to output in comparison with other industries.[1] Moreover, substantial access to operating capital is also required.

The owner-operator type of organization is typical of Canadian agriculture. Of the 353,000 farms classified by the Census as commercial farms (i.e., value of products sold of $1,200 or more), 239,000 were operated by the owner, while an additional 93,000 were partly owned by the operator and partly rented. Only 22,000 were operated by a tenant or a manager.

In an industry which has a heavy capital requirement in relation to output, the heavy emphasis on owner-operated farms has substantial implications. In a working paper prepared for the Royal Commission on Banking and Finance, the sources of financing farm capital are analyzed. The following excerpts are taken from this working paper:[2]

> "The tendency in Canada for farmers to provide such a large proportion of their own financing (92 per cent in the 1958 DBS survey) represented the influence of several factors. On many of the numerous small farms, self-financing was imposed by the lack of income to repay borrowed capital. On many farms, both large and small, self-financing was preferred because of the operator's desire for the independence of owning his farm fully, his fears of debt or other related reasons."
>
> "If all farmers in Canada had to finance 92 per cent of their investment there would be little progress in expansion and improvement of farm enterprises except for those infrequent periods when farm incomes were relatively high. For example, the period 1946 to 1953 was one of rapid expansion of farm enterprises financed substantially from income, especially in the Prairies, and the momentum of this expansion carried forward through most of the 1950's. Yet such ability to finance development by farm income was unlikely to recur under current agricultural conditions, barring war or other special circumstances. This meant there could be only limited development in agriculture unless more financing was to be done on credit."
>
> "Thus, the role of equity or operator's capital should not be overemphasized as far as financing agriculture is concerned. Considering the great number of small farms involved in Canadian agriculture, much of the rise in equity capital represents mainly inflated values of land resources unchanged since about 1920. For the part of agriculture that is developing and improving, it is necessary more and more to look to sources other than this traditional form of equity capital to finance the adjustment of farming."

The present pattern of farm operation and ownership is likely to be under considerable stress in the years ahead as the number of farm transfers from the aging present generation to new operators takes place. Carr outlines the problem of farm ownership

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1/ See Derek A. White, "Business Investment to 1970", Staff Study No. 5, Economic Council of Canada, Ottawa: Queen's Printer, 1964.

2/ D.W. Carr & Associates, "Farm Credit in Canada", pp.62, 64-5, Ottawa: Queen's Printer, November 1962.

transfer and its implications as follows:[1]

> "A major transfer of farm enterprises had taken place in the period 1945 to 1952. Another generation would be due to take over again in the decade 1965 to 1975. By that time, investment per farm will have increased further. The demand for credit to finance such transfers is likely to become pressing. The maximum loan of $27,500 offered by the Farm Credit Corporation in 1963 would fall short of meeting the demand from a major part of this important group of farms. The farmers themselves were the only other significant source of financing in prospect."
>
> "Some of the larger farms, of course, were approaching a scale and profitability where equity or corporation-type financing could be considered. Yet it should be noted that there was a strong philosophy in the industry that opposed this corporation approach to farming, favouring the family farm and all that it implied in financing."

It should be observed that federal legislation was enacted in 1964 that raised the maximum loan limits on farm mortgages to $40,000 for unsupervised loans, and $55,000 for supervised loans.[2]

There are difficult problems of access to capital in the substantial amounts now required to farm efficiently. These problems are by no means limited to the provision of capital in the form of land, buildings, machinery and equipment. The access to operating capital probably is even more difficult. Furthermore, in this aspect of farm management as well as other aspects of running an efficient farm business, the limited management ability on many farms poses very severe limitations. If Canadian farms are to be well managed, an adequate level of education is of paramount importance. At the present time, educational levels in agriculture are low. In 1961 only 29 per cent of farm operators had more than elementary school education, in comparison with 75 per cent of those engaged in managerial occupations elsewhere in the economy.[3] The farm youth continue to obtain less formal education than the city youth. Of the boys in the 15 - 19 age group living on farms in 1961, 52 per cent were attending school as compared with 66 per cent out of the same age group in cities. While this is understandable in view of the higher costs of going to school for the farm youth, both in terms of the direct costs of attending school as well as the indirect costs through the loss of time that could be spent helping the father with farm work, it means that the coming generation of farmers although more educated than the last, will also have less than average education since they will be drawn mainly from the farm youth of today.

1/ Ibid., p.40.

2/ 1964 Amendment to the Federal Farm Credit Act.

3/ Dominion Bureau of Statistics Census of Canada, Labour Force, 1961, Ottawa: Queen's Printer.

IV - DEVELOPMENTS IN CANADIAN AGRICULTURE TO 1970

We have indicated that the level of production on Canadian farms in 1970 may be about 20 per cent above the 1961-63 average. This amounts to an average annual rate of increase of about 2 per cent. During the post-war period, a rate of increase of this order has been accomplished with a decline in total inputs. A sharp decline in the agricultural labour force has taken place, made possible to a large extent by the relatively full mechanization of field operations[1/] and some mechanization of other operations. The displacement of horses by tractors as the source of farm power has been the most significant aspect of farm mechanization; in addition to reducing agricultural labour requirements, it released a substantial acreage of land formerly devoted to the production of feed for horses. Besides mechanization there have been other technological developments which are too numerous to outline here.

Prospective Technological Changes

While it is reasonable to expect some further impact of mechanization on field operations through increased sizes of machinery, particularly in the grain-growing areas of the Prairie Provinces, it is likely that increased mechanization of livestock and other operations which is already under way, will be more significant. More use is being made of tractor power-takeoff-driven machinery, and there has been an increase in the proportion of commercial farms with electric power, from 58 per cent in 1951 to 88 per cent in 1961. Still, much of the application of mechanization to various operations other than crop production has yet to take place. In his paper for the Resources for Tomorrow Conference,[2/] Downing summarized some of the prospects in this area as follows:

> "Animal units per man will continue to increase as more and more equipment is used in livestock farming. Gutter cleaners are being purchased in increasing numbers. Silo unloaders with self-feeding bunks are becoming popular. Bulk milk tank operations in the dairy industry are becoming essential in any major milk shed area. Indeed, materials handling in all of its aspects is fast becoming an important item of farmstead mechanization."

A number of developments other than mechanization may be expected to have a substantial impact on crop production. In dealing with some of the prospective developments,

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1/ In 1961, nine out of ten commercial farms in Canada had at least one tractor and presumably with it the necessary complement of field equipment. Specialized field equipment was also available on most commercial farms where its use was economically feasible.

2/ C.G.E. Downing, "Mechanization", Resources for Tomorrow Conference, Montreal, 1961, Vol. I, p.91, Ottawa: Queen's Printer.

it is important to recognize the fact that in much of the agricultural area of Canada, the growing season is limited. For example, developments in hybrid corn have been much less important in Canadian agriculture than in United States agriculture. But plant breeders are developing corn varieties suitable to wider areas than southwestern Ontario, and the area seeded to hybrid corn is spreading. In the United States, livestock feeding is based largely on corn. As MacFarlane and Black observe: "The livestock feed economy of Canada is built around barley, oats, wheat, hay, forage and pasture".[1/] With the move towards increased emphasis on livestock production, production of barley will be important. There has been considerable work done by plant breeders on barley varieties, and substantial improvements in varieties for use in livestock feeding may be in prospect. In terms of crop production, the use of fertilizers and herbicides also is important. Fertilizer use is expected to increase. The use of herbicides may affect considerably the traditional attitudes towards the practice of summerfallowing in the Prairie Provinces, as Shebeski outlines in a paper for the Resources for Tomorrow Conference:[2/]

> "Much more significant, however, may be the impact of technology and agricultural extension on the institution of summerfallowing in the Prairie Provinces. Experience and experimental data have convincingly demonstrated the need for a high proportion of land in summerfallow in the Brown and Dark Brown soil zones of Western Canada. The same cannot be said, however, for the more humid areas of the Black, degraded Black and Grey Wooded soils which have similarly been subjected to the practice of summerfallowing. Although the reason for fallowing in these areas may be more as a measure of weed control than moisture conservation, this reason is also no longer valid in the light of available selective herbicides. The beginning of a trend toward longer term crop rotations in the Park Belt of the northern prairie region is already in evidence and is in keeping with the need for more forage crops for increasing livestock populations. Dion and the Gordon Commission are in general agreement that this trend will be accelerated because of the increasing demand for livestock products. Both estimate that by about 1980 the present 30 per cent of cropland annually in fallow may be reduced by about half and thus release an additional 6 million acres for cropping. Although a considerable portion of the impetus toward this anticipated reduction in fallow may be attributed to economic forces, nevertheless technological innovations such as more selective herbicides and the availability of improved tillage equipment for implementing more efficient moisture conservation practices will also play a significant role."

In a paper on Plant and Animal Breeding for the same Conference, Weir summarizes potential developments in the livestock field in the following general terms:[3/]

1/ Op. cit., p.11.

2/ L. H. Shebeski, "Implications of Technological Change for Agricultural Productivity", Resources for Tomorrow Conference, Montreal, 1961, Supplementary Vol., p.8, Ottawa: Queen's Printer.

3/ J.R. Weir, "Plant and Animal Breeding", Resources for Tomorrow Conference, Montreal, 1961, Vol. I, p.79, Ottawa: Queen's Printer.

"Hybridization and the formation of new breeds and strains already have resulted in modern broiler production efficiency where two pounds of feed are needed to produce one pound of broiler, and where an average of 260 eggs per hen housed are a reality. Application of known principles could result in similar gains in livestock. Swine breeding experiments have shown that a 200-pound pig can be produced in four months with as little as 2.5 pounds of feed for each pound of live pork produced. Calves of over 600 pounds at six months of age have been produced, compared with an average of 400 pounds or less. Gains of four pounds a day in beef cattle on feed are possible, which is nearly double what is being achieved in the field. Even though dairy production has practically doubled, per animal unit, in the past 50 years, it seems quite feasible that a similar rate of increase is possible in the foreseeable future. Many cows produce more than 20,000 pounds of milk a year and it should be possible, using the best scientific procedures, to achieve such production on a herd basis, even on a national basis. Application of all the scientific principles of breeding, feeding and management, as well as disease control could double the livestock products, using the same amount of feed units as at present."

This brief outline of prospective technological changes in agricultural production suggests that there will continue to be increases in agricultural production without an increase in the total inputs used in agriculture.

Changes in the Organization of Agricultural Production

Changes in the organization of agricultural production are also expected to continue. Farms will continue to grow in size, with enlargement in Eastern Canada taking place through further declines in the number of marginal farms either by amalgamation with other farms or by abandonment. Further enlargement in the Prairie Provinces, accompanying the increase in size of machinery, may take place, and it is likely that a considerable part of the enlargement will be accomplished by existing farmers renting additional land. This would be a continuation of a trend already apparent. Between 1951 and 1961, while the number of commercial farms in the Prairie Provinces that were owner-operated declined from 57 per cent to 53 per cent, the ones that were combinations of owned and rented land increased from 31 to 38 per cent. A restraining factor in enlargement of farms through the purchase of additional land will be the inability or unwillingness on the part of the farmer to increase further the amount of capital tied up in land. Increase in the scale of operations through increase in farm acreage, however, may be less of a factor in the years ahead than increased livestock production. A considerable part of this increase in livestock production may take place in the Prairie Provinces. Drummond has made the following observation on this expected shift:[1/]

1/ W. M. Drummond, "Supply Outlook and the Canadian Agricultural Production Pattern in 1980", Resources for Tomorrow Conference, Montreal, 1961, Vol.I, p.41, Ottawa: Queen's Printer.

"While all parts of the country will share in the production expansion everything suggests that a very large part of the additional total will be produced in the Prairie Provinces."

In the previous section we mentioned the relatively low educational level that prevails in agriculture and the problem that this creates in obtaining an adequate level of management on individual farms. In addition, there are problems of access to credit related to the large number of farm operators, their dispersed location, and the wide range of management ability available. There are solutions to these deficiencies of management ability and credit that have been used in some types of agricultural production, but they involve a degree of management control by nonfarmers. As the rate of transfer of farm ownership increases during the coming decade the owner-operator type of farm organization will be under severe strains and there will be a growing need for acceptable types of institutional arrangements that will make capital and managerial skills more available on a widespread basis.

The technological and other changes that will be taking place will affect the number of farms that will be in operation in 1970, and the size of the labour force that will be working on these farms. In attempting to forecast the numbers that will be in the agricultural labour force, it is useful to fit the 1961 agricultural labour force to the various classes of farms to see how much slack appears to exist. Even with the rapid movement of labour out of Canadian agriculture since the end of the war there are still a substantial number that could move out without having any great effect on over-all agricultural production. While in some parts of Canada (e.g., the Prairie Provinces), a sharp upward shift in the level of agricultural production may have some effect on the demand for agricultural labour, it will be the organization of agriculture in terms of the number and type of farms that will be the major factor, along with the general level of employment opportunity outside of agriculture, that determines the size of the agricultural labour force.

The decline in the size of the agricultural labour force in Canada during the post-war period is part of a general reduction in the number engaged in agriculture in all advanced countries. The annual average rate of decline from 1950 to 1962 in each of 11 countries for which information is available for most of the period was 2.0 per cent or greater.[1/] For Canada, France and Belgium, the rate approximated 3.5 per cent per annum.

1/ The information is drawn from Manpower Statistics, 1950-1962, OECD, 1963. For most of the countries the estimates relate to the total labour force engaged in forestry, hunting and fishing along with agriculture.

In Canada in 1961, there were 481,000 farms enumerated in the Census of Agriculture. Of these, 38,000 were classified as "part-time farms", and 44,000 as "residential and other small farms" (value of products sold per farm less than $250) (see Table 4). If one assumes that the operators of these two groups of farms do not appear in the agricultural labour force because they are employed elsewhere, we would expect to find 399,000 farm operators in the agricultural labour force classified as self-employed. In the 1961 Labour Force Census, there were 397,000 self-employed in the occupational grouping by class of worker in the agricultural labour force.[1/]

Let us make the assumption that the rate of decline in the number of "part-time farms" and "residential and other small farms" will not affect the agricultural labour force. We can then look for future declines to occur in the two groups of farms with value of sales per farm from $250 to $1,199 and from $1,200 to $2,499, excluding the part-time farms. These two groups declined in number by 46 per cent and 38 per cent respectively between 1951 and 1961, while "commercial" farms with sales of $2,500 and over increased by 10 per cent. Under conditions of relatively high employment in the economy generally in the years ahead, the rates of decline for the two groups below $2,500 sales between 1961 and 1971 may be greater than in the decade of the 1950's, and the over-all decline in the number of farms may approximate 60,000. While these two groups represented 29 per cent of all farms in 1961 or 35 per cent of the total excluding part-time and residential farms (see Table 4), they accounted for less than 10 per cent of the total value of agricultural products sold. The release of the operators of the 60,000 farms would entail an equivalent reduction in the number of farm operators. On these assumptions, the number of self-employed in the agricultural labour force would decline from 397,000 in 1961 to about 337,000 in 1971.

One of the major factors affecting the rate of decline in the number of farms and the agricultural labour force is the relationship of agricultural to nonagricultural incomes. It is obvious that substantial income differences exist between agricultural and alternative nonagricultural occupations because there has been a substantial net shift out

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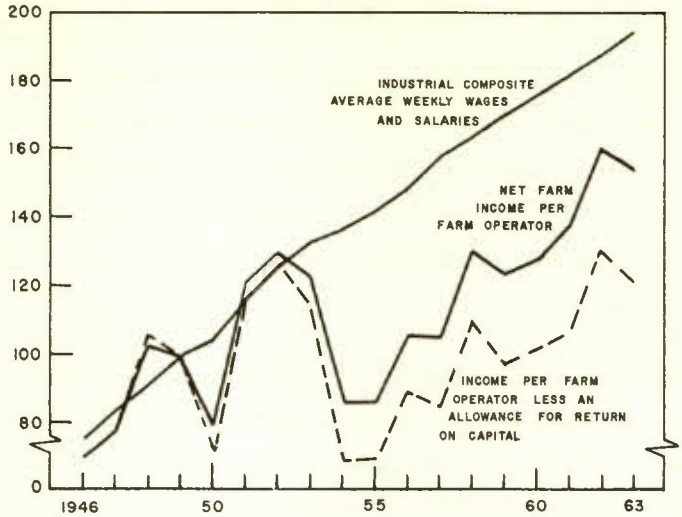
[1/] In other words, to the extent that operators of the 82,000 "part-time" and "residential" farms are counted in the agricultural labour force, they are roughly offset by operators of the remaining 399,000 farms who are not counted in the agricultural labour force. In 1951, there were 471,000 farms excluding the 152,000 "part-time" and "residential" farms, but the Labour Force Census enumerated 548,000 self-employed in agriculture.

of the agricultural labour force throughout the post-war period. But the matter is not simply one of income differences. The capacity to earn income is affected by education, sex and age as well as other factors and there are important differences in these respects between those employed in agriculture and those employed elsewhere in the economy. In addition there are factors other than the level of income that influence one's choice of an occupation. These include security of income, costs of living, hours of work, travel time to and from work, the proportion of the family that can be employed, as well as one's attitudes towards farming as a "way of life" with its greater independence and more time spent outdoors. Thus, it is difficult, although not impossible, to assess income differences between agricultural and nonagricultural occupations.

Some perspective can be obtained by looking at changes in incomes in agriculture as compared with other occupations. Changes in annual income per farm operator may be roughly indicated by dividing the annual estimates of realized net farm income by the annual average number of farm operators as estimated in the Labour Force Survey. This attributes to the farm operator a return for his net capital investment and his management and labour as well as that of his family. Changes in average income per farmer measured in this way can be compared with income changes in other occupations. A comparison is shown in Chart 4, which also shows the changes in income per farm operator after deducting an allowance for return on capital. The changes shown are in current dollars. They indicate that incomes of farm operators increased at much the same rate as those of wage and salary workers employed elsewhere in the economy until 1952 or 1953, and that after a sharp decline in 1954, farmers' incomes have again increased as fast as those of the other group. By 1963 farmers' incomes were 54 per cent above the 1949 level while incomes of wage and salary workers elsewhere in the economy had increased by 94 per cent. Measured in constant 1949 dollars, incomes in agriculture had increased by 13 per cent while incomes in nonagricultural occupations had increased by 46 per cent. If an allowance for a return on capital was deducted from farmers' incomes, the increase in current dollars was 21 per cent, and in constant dollars there was a decline of about 10 per cent.[1/]

[1/] General factors affecting agricultural incomes over the ten-year period from the average of the years 1944-48 to the average of the years 1954-58 are analyzed in two articles by W. Mackenzie in the Canadian Journal of Agricultural Economics, "The Terms of Trade, Productivity and Income of Canadian Agriculture" (Vol. IX, 1961, No.2) and "Regional Changes in Income, Terms of Trade and Productivity within Canadian Agriculture" (Vol. XI, 1963, No. 2).

CHART 4
CHANGES IN INCOMES OF FARMERS
AND INDUSTRIAL WORKERS
(1949 = 100)



Source: Based on data from Dominion Bureau of Statistics and estimates by Economic Council of Canada.

The extent of the reduction in the size of the agricultural labour force is influenced also by the availability of employment opportunity elsewhere in the economy. With the assumption of potential output and a high level of employment, the alternatives available would be greater than during the late 1950's and early 1960's.

We have suggested that the self-employed group in the agricultural labour force might decline by about 60,000 between 1961 and 1971. To account for the remainder of the agricultural labour force, the most fruitful approach would appear to lie in a consideration of the proportion of "hired" farm workers (paid and unpaid) to self-employed. In the 1961 Labour Force Census, the ratio of "hired" workers to self-employed was 0.64. A measure of change from 1951 to 1961 cannot be obtained because of the apparent under-enumeration of unpaid family workers in the 1951 Census. Shifting to the estimates of the June Labour Force Survey for 1951 and 1961, one observes a decline in the ratio from 0.62 in 1951 to 0.55 in 1961. With a relatively high level of employment postulated for the economy generally, it is reasonable to assume that this group, as enumerated in the Census will decline in relation to the self-employed. A decline from 0.64 to 0.50 in the ratio of "hired" to self-employed would result in the "hired" group dropping from 252,000 to 168,000. Coupled with the self-employed, there would be a decline from 649,000 in 1961 to 505,000 in 1971, or a decline of 22 per cent.

The above assessment of the prospective rate of decline in the agricultural labour force from 1961 to 1971 makes use of the measure of the agricultural labour force obtained from the occupational classification in the Labour Force Census. If we apply the same percentage decline to the agricultural labour force annual average estimated at 691,000 for 1961 in the Labour Force Survey, a 1971 projection of 538,000 is obtained. By 1963, the average number had declined to 655,000. The decline between 1963 and 1971 would, therefore, not average much more than 2 per cent annually as compared with an average rate of decline over the post-war period to date of almost 4 per cent per year. For 1970, therefore, under conditions of relatively high employment in the over-all economy, it is expected that the agricultural labour force may approximate 550,000, with the number employed averaging about 540,000.[1/]

With output by 1970 increasing to a level about 20 per cent above the 1961-63 average, the output per worker in agriculture would continue to rise at a substantial rate, although not as fast as it has since the end of the war. In another staff study, in which the rate of increase in output per worker is analyzed more fully, the very high average rate of increase in the first ten years after the war stands out.[2/]

In terms of areas, the agricultural labour force will decline least in the Prairie Provinces where agricultural production is expected to increase relatively more than in other areas. In fact, if export demand for grain continues high, incomes in farming in the Prairie Provinces may reach a point where the net out-movement from agriculture stops. The rate of decline in the agricultural labour force since the end of the war, in this region has been less than in all other regions except British Columbia.

In dealing with the capacity of farmers to cope with the continuing forces of change and adjustment, we referred briefly to the relatively low average levels of education among farm operators. Furthermore, with a rapid decline in the number of farms and little opportunity for young farmers to start farming in the decade between 1951 and 1961, farmers have been an aging group. By 1961 the proportion below 35 years of age had decreased and the proportion above 55 had increased as compared with 1951; the average age

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1/ The above comments relate to the total agricultural labour force, with no reference to the regional or sex breakdowns. The agricultural labour force has declined steadily since the end of the war. Since 1955, however, the number of women has been increasing, from 36,000 in 1955 to 69,000 in 1963, based on annual averages. An examination of this increase suggests that it is accounted for by increased participation by the housewife who is putting in more hours per week in farm work.

2/ See B.J. Drabble, op. cit.

of farmers had risen almost to 50. Both increasing age and low education tend to reduce a farmer's desire and ability to adjust to new circumstances. Between now and 1971, however there will likely be an opportunity for more young farmers to start farming, and the proportion of younger farmers may increase somewhat. In addition to the basic mechanical and other skills required in farm operation, they will need to be well equipped in terms of formal education and business ability if they are to manage complex farm businesses efficiently in a period of rapid change.

V - SUMMARY

With strong economies in Canada and in other countries, it is expected that the market for Canadian agricultural products will increase about 20 per cent between 1963 and 1970. Judging from past experience an increase in production of this order over the 1961-63 average level will likely be accomplished with fewer total inputs, mainly because the agricultural labour force is expected to decline. At potential output, the Census in 1971 will probably show about 60,000 fewer farms, or 15 per cent less than in 1961, leaving aside the residential and part-time farms. With this decline concentrated among the small, less commercial farms, the average size of farm will increase somewhat. Increases in the scale of operations through increased farm acreage, however, may be less of a factor in the years ahead than increased livestock production. With an average annual rate of increase in demand of 2 to 3 per cent and a decline in the number of farms, the cash income per farm in 1970 would be considerably above the 1961-63 average level. Exports are the major factor that may be expected to cause variations in the demand for Canadian farm products. We have indicated that exports in 1970 may be slightly above the 1963 level.

With the further reduction in the number of farms and changes expected in the operation of these farms, we have indicated that between 1963 and 1970 there would be a further decline of about 100,000 in the agricultural labour force. This would be a continuation of a trend that has existed since the end of the war. Most of this decline would be in areas other than the Prairie Provinces. The decline in the size of the agricultural labour force in Canada is part of a general reduction in the number engaged in agriculture in all advanced countries, although the rate of reduction in Canada has been greater than in most other countries. The rate is not expected to be as great in the years ahead, however, and may not average much more than 2 per cent as compared with 4 per cent in the first post-war decade and close to 3 per cent in the 1956-63 period.

TECHNICAL STUDIES

The following is a list of technical studies which have been prepared as background papers for the First Annual Review of the Economic Council of Canada. They are being published separately and are available from the Queen's Printer, Ottawa. Although they are being published under the auspices of the Economic Council, the views expressed in them are those of the authors themselves.

Staff Studies

1. Population and Labour Force Projections to 1970, by Frank T. Denton, Yoshiko Kasahara and Sylvia Ostry.
2. Potential Output, 1946 to 1970, by B. J. Drabble.
3. An Analysis of Post-War Unemployment, by Frank T. Denton and Sylvia Ostry.
4. Housing Demand to 1970, by Wolfgang M. Illing.
5. Business Investment to 1970, by Derek A. White.
6. Special Survey of Longer Range Investment Outlook and Planning in Business, by B. A. Keys.
7. Canada and World Trade, by M. G. Clark.
8. Export Projections to 1970, by J. R. Downs.
9. Federal Tax Revenues at Potential Output, 1960 and 1970, by D. J. Daly.
10. National Saving at Potential Output to 1970, by Frank Wildgen.
11. Changes in Agriculture to 1970, by John Dawson.

Special Studies

1. Immigration and Emigration of Professional and Skilled Manpower During the Post-War Period, by Louis Parai.
2. A Survey of Labour Market Conditions, Windsor, Ontario, 1964: A Case Study, by G. R. Horne, W. J. Gillen and R. A. Helling.

Date Due

Changes in Agriculture to 1970, *by* John Dawson

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