Students' Story of Wheat

BY A. W. BEATTIE & B. FRIESEN

PUBLISHED BY ALBERTA WHEAT POOL FEBRUARY, 1970
FOREWORD

Bread has been described as the "staff of life", and bread to most of the human family means wheat bread. Wheat is important in other foods as well. It is man's chief source of food today.

Present world supplies of wheat are adequate for man's needs. Where starvation stalks today communication and transportation are to blame. But mankind will be hungry again and it will test the farmer's skill to supply enough wheat to avert catastrophe.

Wheat is an important crop, and an important export commodity in Canada. It generates employment in a dozen secondary and related industries. Wheat makes work for Canadian railways, millers, bakers, sailors, bookkeepers, communications, truckers, feeders, meat packers and so on.

It is because wheat is now important, and will be important that this booklet has been prepared. It is designed particularly for students in Alberta schools; it is available, free of charge to anyone, from the Public Relations Department of Alberta Wheat Pool, Box 2700, Calgary, Alberta.
WHEAT — ITS IMPORTANCE

Wheat is one of the oldest cereals known to man. It is the most important of all the grains at the present time and will likely increase in importance as a human food as time goes on. Historical records indicate that wheat was first used by man in the Tigris - Euphrates Valley in the countries we now recognize as Syria, Iran and Mesopotamia. It seems likely that wheat is native to much of the Mediterranean area. Use of this cereal dates back as far as 75,000 years and there is historical evidence of its cultivation for 70 centuries.

The earliest actual evidence of wheat was found in ruins of the Swiss Lake dwellers who lived 10,000 to 15,000 years ago in a Stone Age culture in present day Iran. Remains of cakes baked from coarsely ground wheat and barley are evidence that these crops were both used as human food by them. Well preserved wheat samples were found in tombs in the Egyptian pyramids which have stood for at least 5,000 years. Jewish history contains many references to wheat, often referred to as corn; and the story of Joseph, who some 4,000 years ago, stored wheat in Egypt against the day when there would be drought and famine is well known to every Sunday School student.

WHEAT — THE DOMINANT CEREAL

For centuries man has used wheat as bread because it has the ability to rise when leavened, and retain an airy openness which the dough of other cereals does not possess to the same extent. It is also used in many other forms of food. Noodles and macaroni are important in Europe and parts of Asia. Chapati is the main form of wheat food in India and Pakistan. Bulgur is a form of wheat long used in the Middle Eastern countries, and pizza is a favorite wheat food in Italy.

Wheat is not the main cereal in Far East countries where rice still predominates, nor in African and Spanish American countries where corn (maize) is the most important cereal.

WORLD PICTURE

Some idea of the relative position wheat occupies in world grain production can be gained by the following table for the year 1967/68:

<table>
<thead>
<tr>
<th>Region</th>
<th>Area Hectares</th>
<th>Production Metric Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Grains</td>
<td>72</td>
<td>190</td>
</tr>
<tr>
<td>Wheat</td>
<td>28</td>
<td>72</td>
</tr>
<tr>
<td>Barley</td>
<td>15</td>
<td>46</td>
</tr>
<tr>
<td>*Others</td>
<td>29</td>
<td>70</td>
</tr>
<tr>
<td>Rice</td>
<td>0.3</td>
<td>1.5</td>
</tr>
<tr>
<td>North and Central America</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Grains</td>
<td>98</td>
<td>247</td>
</tr>
<tr>
<td>Wheat</td>
<td>37</td>
<td>60</td>
</tr>
<tr>
<td>Maize</td>
<td>35</td>
<td>134</td>
</tr>
<tr>
<td>*Others</td>
<td>25</td>
<td>49</td>
</tr>
<tr>
<td>Rice</td>
<td>1.4</td>
<td>5</td>
</tr>
<tr>
<td>U.S.S.R.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Grains</td>
<td>115</td>
<td>139</td>
</tr>
<tr>
<td>Wheat</td>
<td>67</td>
<td>77</td>
</tr>
<tr>
<td>Barley</td>
<td>19</td>
<td>25</td>
</tr>
<tr>
<td>*Others</td>
<td>29</td>
<td>37</td>
</tr>
<tr>
<td>Rice</td>
<td>0.2</td>
<td>0.7</td>
</tr>
<tr>
<td>South America</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Grains</td>
<td>32</td>
<td>45</td>
</tr>
<tr>
<td>Wheat</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Maize</td>
<td>16</td>
<td>22</td>
</tr>
<tr>
<td>*Others</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Rice</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Asia (Excludes Mainland China)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Grains</td>
<td>189</td>
<td>231</td>
</tr>
<tr>
<td>Wheat</td>
<td>36</td>
<td>38</td>
</tr>
<tr>
<td>Sorghum and Millet</td>
<td>41</td>
<td>21</td>
</tr>
<tr>
<td>Rice</td>
<td>85</td>
<td>144</td>
</tr>
<tr>
<td>*Others</td>
<td>27</td>
<td>28</td>
</tr>
<tr>
<td>Africa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Grains</td>
<td>63</td>
<td>55</td>
</tr>
<tr>
<td>Wheat</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Sorghum and Millet</td>
<td>32</td>
<td>23</td>
</tr>
<tr>
<td>Maize</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>*Others</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Rice</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Oceania</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Grains</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>Wheat</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>*Others</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Rice</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>World (Excluding Mainland China) except for Rice</td>
<td>614</td>
<td>1,010</td>
</tr>
<tr>
<td>Total Grains</td>
<td>192</td>
<td>271</td>
</tr>
</tbody>
</table>
Oats ........................................ 29 49
Sorghum and Millet ...................... 85 71
Barley ....................................... 58 101
Maize ....................................... 96 229
Rye ........................................... 23 32
Mixed Grain ................................ 3 6
Rice .......................................... 126 253
*"Others" includes crops not listed plus some small acreages of listed crops which countries did not report separately.

2. Production Yearbook, 1967, FAO.

Note: Rice Figures are 1966 Estimates.

Conversion Factors: 1 Hectare = 2.4710 Acres
1 Metric Ton = 1000 Kgs. = 0.984205 Long Ton
= 36.74371 Bushels = 2,204.62 lbs.

Figures given under "world" are greater than totals by continents in some cases because reporting systems vary by countries and figures are incomplete for Mainland China and some other countries.

Rice is the main food of the people of the Far East including China, Taiwan, Japan, India, Thailand, Burma, and East Pakistan. As a country's average income and standards of living improves, more wheat is eaten and rice becomes less important. In developed nations, as incomes rise, wheat usage declines and less wheat is consumed.

BREAD

Bread made from wheat flour is palatable human food, high in both carbohydrates, needed to produce energy and body heat; and proteins, required to build muscle. Wheat bread contains valuable supplies of minerals and vitamins, and it is common practice in many countries to add additional vitamins to wheat flour, especially Vitamin B, Thiamine, Niacin and Riboflavin, to provide a more complete food. The average loaf of bread is made up as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrates</td>
<td>52.5%</td>
</tr>
<tr>
<td>Protein</td>
<td>9.0%</td>
</tr>
<tr>
<td>Fat</td>
<td>2.0%</td>
</tr>
<tr>
<td>Minerals</td>
<td>1.4%</td>
</tr>
<tr>
<td>Water</td>
<td>35.1%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

One slice of bread without butter contains an average of 83 calories. Bread is an exceptionally digestible food easily broken down by the digestive juices and readily absorbed into the blood stream. Bread is recognized as an essential part of the diet over most of the world today and its absence would create a major imbalance nutritionally, and in terms of world trade.

Canadians eat 2.9 billion pounds of wheat annually, mostly in the form of bread. This is about 139 lbs. for each Canadian per year. Wheat is used in Canada to a small extent as a constituent of such foods as macaroni, baking and pastry products, and prepared cereals. These are minor uses however, compared with bread.
OTHER COUNTRIES

In other lands, wheat finds its main use in unleavened bread and products which Canadians hardly know, or use only slightly.

Arab bread, usually unleavened, is made from white wheat and looks a bit like a large scone.

Spaghetti, macaroni and noodles make up the bulk of Italian wheat food as well as some other European countries. In Italy, the law requires that these products be made entirely from Durum wheat.

Chapati is a mixture of high extraction flour, salt and water, cooked like a pancake; Chapati is the way Indian and Pakistani people eat wheat. White wheat is usually used. (See back cover).

Bulgur is a wheat dish common in the Middle Eastern countries made by boiling wheat, then drying it and cracking the grain into coarse particles. Bulgur is boiled and eaten like rice. Amber Durum and white wheats are preferred.

Steam bread is a leavened bread made from flour with yeast but cooked in a steam oven. It is common in China and Japan and requires a good quality baking wheat.

Pizza, a dish of the Mediterranean area, particularly Greece and Italy, is made from a mixture of flour, water, salt and yeast, and usually topped with cheese or meat. Durum flour or white wheat is preferred.

Other wheat foods of commercial importance include Rycena, World Wheat and Rolled Wheat.

WORLD WHEAT PRODUCTION

The largest producers of wheat are not necessarily the greatest exporters, and some countries producing much wheat are also importers. Of the world crop area devoted to wheat, which amounted to 190,000,000 hectares in 1968, not counting Mainland China, 67,000,000 were located in the U.S.S.R. Russia is by far the largest wheat producer in the world. Other areas of importance expressed in hectares include:

- U.S.A. .......... 24,000,000
- India .......... 13,000,000
- Canada .......... 12,000,000
- Australia .......... 11,000,000
- European Economic Community .......... 10,000,000
- Turkey .......... 7,000,000
- Pakistan .......... 6,000,000

China is considered the third largest producer although figures are not available for that country.

Yields vary with climate and technology, but U.S.S.R. is the greatest wheat producer by a substantial margin, with an annual production of about 80,000,000 metric tons. This compares with 40,000,000 tons for the United States, 18,000,000 metric tons in Canada and 14,000,000 in India.

Yields (in lbs. per hectare) are highest in countries with considerable rainfall. Such countries tend to have low protein, poor milling quality wheat, compared to countries with a lower average rainfall and a suitable growing season, such as Canada. In recent years introduction of semi-dwarf wheats which can withstand the stress of irrigation along with high rates of fertilizer have resulted in increased yields in countries such as Mexico and Pakistan, where wheat production is concentrated in river valleys and irrigation practiced. High yields are presently common in countries such as Denmark, Netherlands and the United Kingdom. Yields of approximately 8,640 lbs. per hectare are common. This compares with about 5,640 in Mexico, 4,080 in the United States, 3,300 in Canada and 2,400 in Russia. Yield has been increased by 50% in countries such as India and Pakistan in recent years and these countries hope to be self-sufficient for wheat in the next few years.

WHEAT IN CANADA

As we have noted, wheat appears to have originated between the Mediterranean and Caspian Seas; but by the year 1500 was used throughout Europe and North Africa as well as Asia Minor. It was introduced to North America by the Spaniards in their conquest of Mexico about 1530.

Wheat was re-introduced many times by different ethnic groups, and
was first grown in Canada in 1604 by a small group of French colonists under Samuel De Champlain in a settlement near the present boundary of New Brunswick. Production was reported to be good, but the colony moved further west and abandoned the 30 acres or so of wheat fields. The British introduced wheat to New England in 1607

Farming in the French tradition was carried on in the St. Lawrence valley; and Canada's first real farm was that of Louis Heriot, established in 1617 on a land grant from the King of France. Wheat was grown that year very near the present site of the City of Quebec, and by 1654 wheat was being shipped from New France to other French colonies.

The establishment of the large scale wheat growing industry which made Canada famous, awaited the development of the West. The industrial revolution in Britain had developed an increased appetite for bread, and Canada under British ownership after 1760, began to develop this market.

THE WEST

Agriculture established along the Red River before the railroad. The first permanent settlement was that of the Selkirk settlers beginning in 1812. Along the Red and Assiniboine rivers on the present site of Winnipeg, Scottish pioneers planted fall wheat on several small plots, prepared laboriously with shovels and hand hoes. Spring Wheat was tried in 1813 but both crops were failures. A successful crop was grown in 1815, a year when there was a long growing season and absence of pestilence.

Southern Manitoba, which grows wheat so easily these days, was difficult 150 years ago for all cereal production. Besides frost, drought, and floods, the Selkirk settlers experienced a grasshopper outbreak, and were constantly harassed by agents of the fur traders, who suspected the settlers would destroy the fur trade. The worst limitation of all was the length of growing season in the Red River Valley. Wheats of that day required more than 130 days without frost, in order to mature. Plant breeding on an organized basis had not yet developed, and the Canadian agricultural experimental farm system had not been dreamt of. A happy accident by which an earlier maturing wheat variety came to Manitoba, was to play an important part in establishing the West as a bread basket.

The earliest shipments of Canadian wheat were from the Red River Valley of Manitoba; and the milling quality of these samples was recognized as outstanding. The wheats began to be referred to as Manitoba's, a term which has stayed with Canadian Hard Red Spring Wheat to this day. An early shipment of wheat from the West was made in 1876, when 857 bushels of seed wheat went to Ontario. In 1877 the first wheat shipment from western Canada to Great Britain went via United States ports. It was not until 1884 that Canada shipped her first cargo of wheat by an all Canadian route. This was a 1000 bushel lot of Manitoba No. 1 Hard

ALBERTA

The opening of western Canada and its development as a granary for the world, awaited the railroad. The two Trans-Canada railway systems followed Confederation in 1867. The Canadian Pacific reached Calgary in 1883 and Edmonton in 1891; and the Grand Trunk was in Alberta by 1904. The flow of homesteaders to all parts of this territory reached its height in the first 15 years of the 20th Century. By 1910 the prairie land of Southern Alberta was almost entirely occupied by homesteaders, and in the following 10 years large numbers of European settlers occupied the parklands of Northern Alberta. To this day, additional lands are being cleared and broken, but the greatest influx of settlers and the largest proportion of land came into cultivation between 1905 and 1920.

The first agriculture in Alberta is credited to missionaries at Fort Chipewyan. As early as 1779 Peter Pond grew vegetables and potatoes near Lake Athabasca; and in 1809 a fur trader named Harmon planted a plot of barley at Fort Dunvegan, on the Peace River. Both experiments were successful.

In 1885 an Anglican missionary, Rev. John Gough Brick established a farm near Peace River Crossing. He was awarded the World Championship for wheat in Chicago in 1892, for a sample of wheat grown on this farm.

The first commercial grain producer in the territory was William Cusin, who in 1876 settled on a farm at St. Albert. In five years he placed under cultivation 180 acres of wheat, which the records say yielded 30 bushels to the acre. He also grew 36 acres of barley and 12 acres of oats.

An encouragement to grain production in the early days was the horse population, maintained by the North West Mounted Police. Joseph McFarlane located on a farm a few miles from Fort MacLeod, and in 1882 harvested 2,000 bushels of grain, mostly oats, for sale to NWMP. Mr. McFarlane also grew 250 bushels of wheat, which was sold for chicken feed because there were no grist mills to grind it into flour.

RED FYFE

In 1842 David Fyfe, farming in Ontario, wrote to a close friend who had taken a trip to Scotland; and asked him to locate some European wheat seed while in the old country. The friend happened to locate a grain boat docked at Glasgow, with a cargo of wheat from the Polish port of Danzig. He obtained a sample of the grain and sent it to Fyfe, who planted it the following spring. Unfortunately the sample was winter wheat and did not mature. However, one plant in the field was of a different type, and did mature. The seed from these heads was carefully harvested and planted the following spring. This wheat was called Red Fyfe because it was red in colour, and belonged to David Fyfe.

Red Fyfe wheat was a good yielding spring wheat, but was also of much better baking quality than any variety available in Canada to that time. Even more important was the fact that it was an early wheat. Red Fyfe permitted Canadian wheat production to expand rapidly. It has become the ancestor of hundreds of varieties of Hard Red Spring Wheat
developed in Canada, stressing baking quality and earliness.

While Red Faye was considerably earlier than varieties available to that time, and permitted wheat to become more dependable in such areas as the Red River valley of Manitoba, it was still too slow maturing for use over much of the prairies. Fall frosts often caught the crop at an immature stage, and lowered the quality of the wheat to near uselessness, for bread making. Wheat acreage was expanding rapidly through the West, and it was plain that a faster maturing variety was essential.

MARQUIS

While Red Faye had developed into a Canadian variety practically by accident, and particularly through the astute observation of one farmer, its immediate descendant, Marquis, was developed through careful planning and selection. In 1904 Dr. Charles Saunders, working for the Canada Department of Agriculture, came upon some seed of a cross, Red Faye by Hard Red Calcutta, an early maturing variety from India. This cross had been made by Dr. Saunders' father, a few years earlier. It was tested, found to be of high quality, and considerably earlier maturing than Red Faye. It was named Marquis. For his part in producing the variety, Dr. Saunders was knighted in 1935 by King George V.

Marquis was an outstanding wheat variety for its time, and to this day is taken as a standard of milling and baking quality for Hard Red Spring Wheat. No other genetic work has had so much influence on the production of wheat. It remains to be seen if the Semi-Dwarf varieties now emerging are as significant a break-through in wheat production.

For all its good qualities, which would make Marquis the dominant variety in western Canada until 1930, it lacked one important need. This was resistance to the wheat disease Stem Rust. Stem Rust invaded western Canada on an annual basis, carried in on the winds from the southern states where it over-wintered; and caused heavy losses, especially in Manitoba and Saskatchewan, as well as in northern U.S.A. In one year, 1916, losses from Stem Rust were estimated at $200,000,000. The search for a replacement for Marquis wheat hastened. A variety which was resistant to rust and was even earlier than Marquis, while retaining all the good milling and baking qualities, was the goal.

THATCHER

In 1935, the variety Thatcher, produced at the University of Minnesota, using Marquis as one of its ancestors, was presented to North American agriculture. Thatcher wheat dominated the acreage figures until the mid 1960's. It was resistant to Stem Rust and was a week earlier than Marquis, as well as being a slightly heavier yielder. Other rust resistant varieties followed, many resistant to a particular strain of rust to which Thatcher was susceptible; and to this day scientists continue to select wheats which will be resistant to new strains of rust, while retaining the original qualities of Marquis. Some fairly important varieties during this period were Redman, Apex, Regent, Sellkirk, Pembina and Manitou.

OTHER SPECIALIZATIONS

Rust was a bigger threat in Manitoba and Saskatchewan than in Alberta, where the wind-borne rust spores arrived later in the spring, and did not reduce the yields in Alberta to the same extent. Other requirements were important however, and at Swift Current wheats which would be resistant to the Wheat Stem Sawfly were developed. The Wheat Stem Sawfly lays its egg in the hollow stem of the young wheat plant, where the grub lives until nearly harvest time. It then descends near the ground, and chews its way out of the hollow wheat stem. This weakening of the wheat stem usually results in the plant breaking over, and being impossible to harvest. The scientists at Swift Current developed a solid stemmed wheat, in which the Wheat Stem Sawfly could not live, and they eventually released three such varieties: Rescue, Chinook, and in 1963, Cypress.

GROWING WHEAT IN ALBERTA

The great majority of Alberta's wheat acres are seeded to hard red spring wheat. Spring wheat is seeded in May, and harvested approximately 110 days later in the very crowded growing season which Alberta's particular climate permits.

When the snow has disappeared and the soil is warm enough for growth to begin, the weeds are destroyed by a stroke of the cultivator on Alberta's wheat fields. After perhaps one more stroke with a smoothing instrument to make a mellow seed bed, the farmer plants the field, using a seed drill pulled by a tractor, placing the seed at a depth of about 3 inches. The wheat he uses probably has been treated with a fungicide, to control smut and root diseases.

The seed drill plants the wheat in rows, 6 or 7 inches apart, and applies fertilizer alongside the seed. Soon after the seed is planted in the moist soil, germination takes place and the first growing point emerges from the wheat kernel. Roots develop in a few days, and a shoot is also sent upward. The roots develop into a dense, fibrous system penetrating the soil to a depth of 4 feet or more. Scientists have calculated the extent of a wheat root system and found that if all roots of a single wheat plant were placed end to end, they would reach a distance of 1,700 feet (almost one-third of a mile).

The upward growing stem develops leaves immediately after it emerges above ground. In a few weeks several stems branch out from the crown of the plant, located just below the soil surface.

Most wheat plants send up 4 or 5 shoots, called tillers. Each of these will develop a head of wheat if conditions are right. The average head of wheat is 3 to 4 inches long, and contains 30 to 65 kernels of grain.

Wheat is a member of the grass family and is surprisingly drought resistant. The crop requires sunshine, air, moisture, warmth, and plant food for an abundant crop. Alberta is famous for summers with adequate
sunshine, warm days and cool nights. Moisture at certain times in the growing season may be a problem, and our soils require additional nitrogen and phosphorus in the form of fertilizer.

If there is a shortage of any of the essential requirements, the wheat plant lets one or more of the tillers wither, and concentrates on producing a head of wheat on each of the remaining tillers.

Wheat requires an astounding amount of water. Tests in Saskatchewan have shown that to produce a single bushel of wheat, about 36 tons of water are needed. In our fairly dry climate, shortage of water is most likely to limit wheat production.

As the crop develops in the spring, ideal growing conditions encourage the growth of weeds, which compete with the wheat crop for moisture, nutrients, and sunshine. It is necessary on most Alberta farms to spray, using a chemical herbicide (weed killer) which is applied by a field sprayer pulled by a tractor, or occasionally by an aircraft sprayer. The hormone weed control chemical, 2, 4-D is used on most farms, as it controls many broad-leaf weeds. More specialized chemicals control individual weeds such as wild oats, and hemp nettle.

After weed control in June, the crop develops very rapidly and by late August the earlier sown wheat fields are ready for swathing. In this operation the grain is cut and laid in a swath, with the head of one plant lying on the straws of the plant cut just previously. The swath does not lie on the ground, but rests on the stubble left by the swather at a height of perhaps 9 inches. A few days of sunny weather and dry fall winds bring the moisture content of the wheat down to less than 14% — dry enough to keep in storage. This is a crucial time for Alberta grain producers, because the ripened wheat must be dry enough to keep for several years if necessary. Delay may mean that the crop is rained or snowed on, and its quality reduced. However, to thresh before the grain is dry, means expensive artificial drying, or risk of spoilage in the bin. Swathing of wheat is normally complete by the middle of September, and in seasons of good harvest weather, combine threshing can begin at that time.

The combine thrasher, commonly called just “combine”, gets its name from the fact that it could cut and thresh the crop in one operation, often referred to as “straight combining”. The practice of straight combining is common in the southern part of the province, but over most of Alberta our weather requires a separate swathing operation, followed by the combine. The combine is a portable self-powered threshing machine which separates the chaff from the wheat kernels, and spreads the straw and chaff out behind the combine on the field, retaining the wheat in a hopper carried on the machine. The wheat is carried from the combine by trucks which take it directly to the grain elevator in a nearby town, if there is space, or to a granary on the farm.

Nowhere in agriculture is the advantage of modern technology better demonstrated than in the combine operation. A Canadian farmer with one machine can harvest over 2,000 bushels of wheat in one day. This compares with the primitive methods of threshing by hand with a flail, or by walking animals around and around on a threshing floor. These threshing methods are still in use in many countries. (See back cover).

The wheat which our Alberta farmer harvests is most likely one of the following varieties — Thatcher, Park, Manitou, or Chinook. It is of uniformly high milling and baking quality, free of harmful ingredients, and dependable in quantity.
GRADING AND SELLING WHEAT

CANADA

Wheat varies in quality depending which species and variety of wheat is grown and under what climatic conditions. Most of the wheat grown in Western Canada is hard red spring, and our climate is ideally suited for growing this type of wheat. Canada has developed a system of grades which describes our hard red spring wheats, and indicates to the purchaser what he can expect his wheat to be like.

We also grow some durum wheat for production of pasta flour and have a system of named grades for this wheat. The third classification is soft winter wheat, and grades for this less important crop are divided for White Winters and Alberta Red Winters.

Canada has had a most elaborate and consistent system of grading varieties of wheat. This system of grading has been an important factor in maintaining the reputation of Canadian wheat abroad. A major revision of Canada's wheat grades, to include protein as a grading factor, is underway at the present time, and it is likely we will have a new system of grades in hard spring wheat soon.

Meanwhile the standards of the "Statutory" or higher grades are carefully defined in the Canada Grain Act and can only be changed by Parliament. This fact, which made Canadian wheat so dependable for many years has recently proven too rigid, and the Canada Grain Act itself is being revised in order that our wheat industry can be more competitive on the international market.

Under the present system the following are the most common grades of bread wheat:

<table>
<thead>
<tr>
<th>Statutory</th>
<th>Commercial</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 Manitoba Northern</td>
<td>#5 Wheat</td>
</tr>
<tr>
<td>#2 Manitoba Northern</td>
<td>#6 Wheat</td>
</tr>
<tr>
<td>#3 Manitoba Northern</td>
<td>Feed Wheat</td>
</tr>
<tr>
<td>#4 Manitoba Northern</td>
<td></td>
</tr>
</tbody>
</table>

The Canadian Board of Grain Commissioners employs a staff of government inspectors who make sure that all grade standards are adhered to, and that grading is uniform.

PROCESS OF GRADING

When the farmer delivers grain to his local elevator it is graded by the elevator agent. However, if the farmer and agent can not agree on the grade, a sample may be taken, and forwarded to the government inspector, who makes a final ruling. The farmer is paid for the grain on the basis of grade.

Page Fourteen

When an elevator agent loads grain into a box car and consigns it to a terminal elevator, it usually includes a number of different farmers' consignments. Therefore, the car of grain being unloaded at the terminal is sampled and a grade determined for the carload. This grade is the basis for sale to an overseas buyer or flour mill. For the protection of the overseas buyer, the grain is again inspected as it is loaded into ships. A shipment of Canadian grain abroad is accompanied by an official government document stating the grade; this is called The Certificate Final. So reliable has been a Canadian Certificate Final, that importers throughout the world have bought Canadian grain on the basis of grade alone, without even seeing the grain.

Page Fifteen
OTHER COUNTRIES

Grading systems in other countries differ markedly from Canadian grades and have changed quite often in recent years. Recent improvements in quality have enabled Australia to expand her range of grades, and to offer a Prime Hard grade of wheat, with a protein guarantee of 12 to 14% and a Hard Wheat, with 11 to 13% protein. The traditional Australian grades have been termed FAQ which stands for Fair Average Quality.

The United States offers a great variety of grades, reflecting the large number of wheat types grown extensively in that country. Typical grades include:

Hard Red Winter
Soft Red Winter
Hard Spring Wheat
Heavy Amber Durum
White Wheat

The many grades of wheat originating from supplying countries are offered at different prices, and those prices vary from day to day depending on competition, and factors such as trade agreements, port of shipment and other specifications. The Canadian Wheat Board announces the price of basic grades of Canadian wheat each day.

MARKETING

CANADA

The complicated process of selling a load of wheat produced on a farm in Western Canada can best be understood by following it through step by step.

When there is room at a local elevator and the producer has not used up his quota of space for that year, he may deliver grain to the elevator. It is weighed, graded and purchased by the elevator agent for the Canadian Wheat Board, and a cash ticket paid to the farmer. The cash ticket is for the initial price for his grade of grain at that time, and sometimes a further small payment is added later. This cash ticket may be taken to any bank and used the same as a regular cheque.

The elevator company now has grain of a certain grade stored in one of the bins in the elevator, where it is bulked with other grain. Or occasionally the farmer concerned may have an entire carload available for sale, with room on his quota; in which case the grain is usually kept separate in one elevator bin.

The process of getting the grain from the elevator to an ocean port involves the head office of the elevator association, the divisional headquarters of the railroad, and the Canadian Wheat Board. The elevator agent advises his head office and the Canadian Wheat Board, that he has a certain supply of the particular grade of grain, and is prepared to ship it.

If the grain is needed for export, or needed by a flour mill the Canadian Wheat Board asks the elevator to consign it in a box car, to a certain port. This port is usually Vancouver or Prince Rupert in the case of Alberta grain. The Canadian Wheat Board asks the railroad to supply a box car, during a certain week, to the elevator point. In due course the elevator agent loads the box car, which is collected by a train, and proceeds to a grain terminal at seaport, or sometimes to a flour mill or other domestic user. Wheat shipped to seaport is unloaded at the terminal elevator, and bulked with a large quantity of similar grain, and the sampling and grading process previously described takes place. Grading and wheat quality standards are the responsibility of the Board of Grain Commissioners, appointed by the Government of Canada.

When an ocean going vessel is awarded to the Terminal, through arrangements made by an export agency or the Canadian Wheat Board, the grain is loaded into the ocean carrier from the terminal elevator and is once more sent on its way; this time to its final destination.

A carefully designed schedule of charges is made at each point where the grain is handled, in the process we have just described. These charges, regulated by the Board of Grain Commissioners, may change slightly from year to year. There is a prescribed elevation charge of about 3½ c per bushel in the case of wheat, and a terminal handling charge. Of course, there is a transportation or freight charge made by the railroad as well as such items as insurance, handling, etc.

This process also includes the determination of the dockage contained in the grain, that is, weed seeds, stones and other non-grain matter. Dockage is calculated and deducted from the payment received by the farmer. A typical cost sheet for this process might be:

<table>
<thead>
<tr>
<th>TYPICAL COSTS ASSOCIATED WITH THE MOVEMENT OF GRAIN FROM THE COUNTRY ELEVATOR TO THE TERMINAL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CENTS BUSHEL</strong></td>
</tr>
<tr>
<td>At Country Elevator</td>
</tr>
<tr>
<td>Elevation, Handling and other charges</td>
</tr>
<tr>
<td>Storage (assume 4 months) at 1/30 cents per day</td>
</tr>
<tr>
<td>At Terminal</td>
</tr>
<tr>
<td>Handling and Elevation charges</td>
</tr>
<tr>
<td>Storage (assume 1 month) at 1/30 cents per day</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>Freight — rail from Settler to Vancouver</td>
</tr>
<tr>
<td>Wheat Board Administrative and other costs</td>
</tr>
<tr>
<td>Interest, bank charges, etc</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
</tr>
</tbody>
</table>

Page Sixteen
LESS: Amount received under the Temporary Wheat Reserve Act (1)

(1)—Since 1956 the federal government has paid the carrying charges on
wheat in storage which is in excess of 178,000,000
bushels as at August 1st.

The bulk handling system for grain used in Canada does not require
bags or other containers at any stage of its journey between farm and
ocean carrier. It is possible only because Canada long ago developed a
system of country elevators, grain carrying trains and terminal elevators,
designed specifically to handle bulk grain without loss or damage.

Most major wheat producers do not have the bulk handling system
so common in Canada and it is not unusual in countries such as Australia,
France and Pakistan to find low warehouses filled with 100 or 200 pound
bags of wheat, awaiting transfer to the next stage of the journey. These
bags may be carried on wheel trolleys or on the shoulders of laborers.
In recent years Australia has modernized her grain handling industry and
patterned it much after Canada’s, using some features of the United States
warehouse system.

Bulk handling of grain requires port facilities at the receiving end
capable of unloading bulk grain. Lack of such facilities presented a
problem in early shipments of Canadian wheat to China. The advantages
of handling grain in bulk has resulted in most importing countries building
bulk handling equipment, able to receive large volumes of loose grain from
ocean carriers.

Sheaves of wheat bound by hand and gathered near the threshing floor (Lesotho).
Photo by A. W. Beattie.

Page Eighteen
COUNTRY ELEVATORS

We have noted that not every grain producing country has a grain elevator system. In many, grain is placed in jute bags at the threshing machine, and stored in low warehouses at railway points and seaports.

Canada determined very early that her future as a grain exporter would be improved if grain could be handled in bulk. This decision was made before 1900. The first country elevator in western Canada was built in Manitoba in 1881. A network of over 5,000 elevators located at about 2,000 railway shipping points was built up over the years. Country grain elevators are still being built today, as new railways reach the frontier. However, the tendency is for consolidation of country elevators, since savings can be achieved by locating larger elevators slightly further apart. Modern farm trucks make this a practical possibility.

A typical country elevator is a tall wooden structure built using crib construction. In crib design, grain bins are built by placing 2 by 4 inch scantlings flat on top of one another — and spiking them together. This provides a bin with 4 inch thick walls of immense strength. Many country elevators have a capacity of about 70,000 bushels located in perhaps 25 bins, although the composite design, having a capacity of twice this much, is becoming common.

The process of receiving grain at an elevator, and placing it in storage, and finally loading it into a box car, can be followed through the drawing (Figure #1). Imagine yourself to be the elevator manager working in the office:

The office (1) is located alongside the driveway and scale. A farmer with a load of grain to deliver drives up the driveway (2) and onto the scale, which is capable of weighing loads of up to 30 tons. You weigh the truck and its contents, and record the weight on a grain delivery slip. Now set the hoist in action — which tips the grain box, and dumps the grain through a grill at the back of the scale, letting it fall into the pit. (3) This is a good size pit or hopper, but it will not hold all the grain from a large truck, so you select which bin the grain should go to — either an empty one, or one containing similar grain to that being delivered. Let us assume you select bin Number 4, so you turn the delivery spout at the top of the elevator to dump grain into that bin. This device (5) in our drawing can be adjusted to deliver grain from the top of the elevator, into any of 24 or so bins in the elevator.

Having selected the bin and adjusted the spouts, start up the endless belt (6) which lifts the grain in cups attached to the belt, to the top of the elevator, and dumps it into the distributor (5) which puts it into our bin (4).

The truck is now empty and is re-weighed to discover by subtraction how much grain was in the load. This amount is entered on a delivery slip and a copy given to the grain producer, or if it is his last load, a cash slip may be made out for the grain delivered.

In time, having accepted several such deliveries, bin (4) and perhaps several other bins are filled with grain of similar kind — enough to fill one or more box cars. When a box car is assigned by your head office, and delivered by the railroad alongside the elevator on a railway spur track, you cooper the car. Coopering is an ancient term which refers to barrel making, and which is used now meaning "to make tight and secure". This means lining the car with building paper where necessary, installing grain tight doors in the box car and being sure that the car is clean. The box car is now ready to load, and the loading spout (7) is placed into the box car. The loading leg (endless belt) (6) is operated and the grain in bin 4 is carried up into the loading spout and the grain falls down the spout into the box car.

Our elevator contains several other pieces of equipment such as the loading-out scale (9) where the grain is weighed before shipment, and the dust removal system (8).

Once the car is full, its doors are closed, a metal seal attached to it. The load is recorded with the company and the railroad, and an early passing train then collects the car and takes it to its destination.
TERMINAL ELEVATORS

Canada is equipped with two types of terminal elevators (located on water). Terminal elevators on tide water are located at such points as Vancouver, Churchill, and Halifax. We also have a system of terminal elevators on fresh water, located along the Great Lakes at Thunder Bay, Goderich, and other points — and along the St. Lawrence River — at places like Baie Comeau and Montreal. The largest concentration of grain storage and shipping facilities is at Thunder Bay where 25 terminal elevators are located. Vancouver is also an extremely important shipping point and West Coast terminals have recently become more important, as Canada's grain trade with Asian countries increased. Inland terminals are located at points such as Edmonton, Calgary, and Moose Jaw. Terminal elevators are huge concrete structures capable of storing several million bushels of grain and equipped to load ocean-going grain vessels, or lake freighters. Some idea of the capacity of a terminal can be obtained by noting that it will hold enough wheat to provide every man, woman, and child in Canada with 30 loaves of bread.

GRAIN IN OUR ECONOMY

Wheat was one of Canada's first important exports and has played a large part in making this country one of the great trading nations of the world. For many years wheat was Canada's leading export commodity and continues to earn between 600 million and a billion dollars per year on the export market. Canada's traditional share of the world wheat market is about 25% and this amounts to between 350 million and 500 million bushels each year (11 to 15 million tons).

Grain leaves the Prairies by railway to terminals at Thunder Bay, the Pacific Coast and Churchill. Canada is the only country which ships grain from three oceans on a regular basis. Large terminals are located at Thunder Bay, and further down the lakes on the St. Lawrence River. The practice is to have the Thunder Bay terminals, located on Lake Superior, filled to capacity when the lake shipping season opens each spring. In the fall the terminals located closer to seaboard are filled, so that shipments can continue throughout the winter from the east coast.

The Churchill shipping season is short and amounts to about 20 million bushels each year. Most of this wheat moves from Manitoba and Eastern Saskatchewan. The Hudson's Bay Route to Europe is shorter than any other route and the same would be true of shipments from Churchill through the Northwest Passage to Russia if that route becomes practical in the future.

The West Coast shipments became more important through the 1960's, as Canada sold larger amounts of wheat to China, U.S.S.R. and Japan. In one year China was actually Canada's largest wheat customer and in several years Japan was our second best customer.

Canada's grain moves great distances over several oceans on its way to market. Typical distances are Montreal to Liverpool, 2,760 miles, Churchill to Liverpool, 2,936 miles, Vancouver to Vladivostok 4,411 miles, Thunder Bay to Havana 3,886 miles.
The future of Canada’s trade in wheat will depend on many influences beyond our control. At present the policy in the European Economic Community is for self-sufficiency in foods, and millers there are required to use a large proportion of European wheat. A change in this policy would likely result in improved opportunities for Canadian wheat. Meanwhile Canada is improving her trade in all grains with countries such as Japan, China, Philippines, Cuba and Taiwan. The wheat which some of these countries require is of a somewhat different standard than the traditional hard red spring high protein wheat, demanded by European customers. Canada appears to be developing a policy which will supply more kinds of wheat, at different prices, to both our new and old customers.

The value of wheat produced in the prairie provinces is about 7% of the gross income for the region. It amounts to about 4% in Alberta and about 15% in Saskatchewan. In Alberta, wheat and barley are almost equally important.

We have already reviewed the developments of wheat growing as an industry in Canada and noted that exports began as early as 1877. Ten years later the Winnipeg Grain Exchange was established and it soon expanded into the largest grain market in the world. The Grain Exchange provided a meeting place where traders, including handlers, dealers, flour millers, exporters, importers and speculators could buy and sell grain. The operations of the exchange were a bit like a daily auction sale, and the price at which wheat was sold on the exchange set the price farmers were paid in the country. This is called the open market system.

The open market system was objectionable to wheat producers because it tended to provide the lowest prices during harvest and early winter, when a farmer had wheat to sell, and needed to sell it to settle his debts. Wheat prices tended to be higher during the spring and summer period. Farmers also objected to the fact that the price was variable from day to day, and the producer might lose a substantial amount of money on a load of grain while he transported it to the market. Finally, the farmer disliked the open market system because there was no price stability over a long period of time. Farmers at seeding time had no assurance that the price their crop would bring in the fall would be the same, or nearly the same, as it had been the previous fall, or was at seeding time.

The depression of the 1930’s was especially cruel to prairie based agriculture. The all time low price for wheat was set in mid-December, 1932 when the world’s best wheat, #1 Northern, brought only 9¢/a bushel, delivered to an elevator in Alberta.

CANADIAN WHEAT BOARD

Throughout the first part of the 20th century, grain producers repeatedly urged the government of Canada to accept some responsibility for marketing grain. Their contention was that since wheat was an export commodity, and a major item in Canada’s trade, the economy deserved stability in wheat marketing. The Government hesitated to enter the
wheat marketing business until World War I, and in 1917 the first Canadian Wheat Board was set up as an emergency war time measure, to ensure a dependable supply of wheat to the Allied Armies, and to regulate supply and marketing in Canada. The Winnipeg Grain Exchange was closed at that time.

Under the Wheat Board the Government set an initial price, which the farmer could depend on, and if subsequent marketing conditions permitted, additional funds were paid to the farmers who had supplied wheat during that crop year. Canada's crop year begins August 1st and ends July 31st. The first Wheat Board got a mixed reception, and when the war ended some farmers pressed to have it eliminated. The initial price at that time was lower than in the United States, and farmers were suspicious of the new marketing system. However, when in the fall of 1920 a final payment of 48c a bushel was paid by the Wheat Board, support soon grew for the dependable organized system of marketing, known as the Wheat Board. However, the Government disbanded the Wheat Board and the market returned to an open state.

In 1923 Western farmers banded together to form the Wheat Pools in hopes of providing for themselves the stability which the war time Wheat Board had given them. They did not, however, give up pressing for a Canadian Wheat Board. But it was not until 1935, in the depths of the depression, that the Government of Canada re-established the Canadian Wheat Board, to market grain with the financial backing of the Government.

In the next few years farmers could market their grain through the Wheat Board, or sell it on the open market. The outbreak of war in 1939 again made wheat a strategic material, and in 1943 with the Allied war effort struggling, marketing of all Canadian wheat was taken over by the Board, where it has remained since. In 1949 oats and barley marketing were added to the responsibility of the Canadian Wheat Board at the request of grain farmers. Flax, rye and canola are still sold on the open market.

Under the Wheat Board system, every farmer receives the same basic price for his wheat when he delivers it to the elevator. The actual returns vary because of differences in grade, and distances from terminal markets. The farmer receives an initial price established by the Wheat Board for the year, when he delivers his grain, and may receive an additional payment when the crop year is finished, and returns are tallied. During all its years of operation the Canadian Wheat Board has lost money on only three occasions. In 1956-57 oats incurred a deficit. In 1953-54 and in 1968-69 the wheat marketing system experienced a deficit.

Under the Board system of selling, all expenses incurred in operating the marketing system, storing the grain, transporting, cleaning, etc. are paid by the farmers themselves. The Government of Canada pays the storage charges on wheat in elevators over 178 million bushels, however. The entire cost is deducted from the final payments. The majority of farmers prefer this system of selling their grain because it gives them a uniform price throughout the year, and assurance that a collapse in prices will not take place.

MILLING

Man has used wheat for food ever since he gathered it as a few grains from wild wheat plants growing in some valley in Mesopotamia. At first he chewed the raw kernels of wheat, and in time learned to like the flavor of wheat which had been accidentally cooked, when spilled near his cave fire.

We cannot be sure when man began to grind wheat into flour. We do know that millstones were in use a few hundred years before the birth of Christ. Long before that the mortar and pestle system was used, though the mortar was no more than a natural hollow in a rock and the pestle only a stone selected because it was convenient to hold. Both wheat and barley used at this time were probably parched or roasted before being pounded, and usually eaten as porridge or mixed with water and kneaded to form dense flat "cakes".

Bread wheats made their appearance in Egypt about 3,000 B.C. These wheats had a very loose hull and were easier to prepare for food. The first flour mill appeared about this time, and consisted of a stone slab sloping gently away from the miller, and a movable stone similar and

Wooden model of servant grinding grain on a saddle stone, from a tomb of about 2000 B.C. (British Museum)
flat on the under surface. As the grain was crushed, it was pushed off the far end of the stone. The rubbing action reduced the endosperm of the wheat to a fine meal while leaving much of the bran in larger fragments. By blowing or sifting out the coarser bran, the Egyptians became the first users of wheat flour.

When and where yeast, which was obtained during the process of making beer, began to be used with wheat flour is not known. No doubt accidentally at first, it was discovered that the introduction of yeast followed by a little time in a warm place provided a dough which rose and was filled with air bubbles. When baked this “cake” was easier to eat and had a nicer flavor than the wheat porridge or heavy cakes, usually eaten. Thus, we have the introduction of leavened bread.

**STEPS IN MODERN MILLING**

1. Cleaning the grain by screening out all foreign matter and by scouring, a process in which the wheat is spun and struck against steel plates to loosen and and remove any impurities. A washing process usually follows.

2. Conditioning or tempering — Moisture is added to the wheat so that the bran layer can be separated more completely and accurately.

3. Milling — The wheat is passed through large corrugated rollers which grind the wheat to a flour consistency. It is then sifted through fine cloth. This process is repeated several times until a very fine white product is secured; these processes are called “breaks”.

The purification system, sizing system, and reduction system all make up part of a modern flour mill.*

Throughout the world people prefer white bread, and millers have endeavoured to make the whitest possible flour. In doing so, they remove several vitamins located near the wheat bran. These vitamins provide humans with strength, energy and disease resistance. To compensate for loss of these vitamins, our flour is re-enriched by adding synthetic vitamins. In this process the flour is actually turned into a better balanced food for humans than it was originally.

**BAKING**

In Canada today, nearly all the flour used for human food is turned into bread in commercial bakeries. The same is true of many countries to which Canadian wheat is exported — especially European countries and Cuba.

Excellent bread can be made with rudimentary equipment as long as the flour is of good milling quality, and the baker knows how to make bread.

However, in the industrialized countries, bread making has become automated and a continuous system of dough mixing is used. The steps in a typical bakery are:

1. Mixing — Flour, sugar, shortening, yeast, milk, salt, etc., are measured into a large container by automatic ladles and thoroughly mixed together.

2. The dough is placed in a fermentation room with carefully controlled temperature and humidity. This permits the yeast to work on the sugars and carbohydrates, producing gases which cause the dough to rise and become open. It is important that the dough is elastic enough to retain these gaseous bubbles without breaking. Flour with a high gluten content processes that elasticity. It is one of the qualities for which Canadian wheat is famous.

3. The dough is divided mechanically into pieces of exactly the right weight. In Alberta, the standard size of loaf when baked is 20 ounces. Different weight loaves are common elsewhere.

4. The dough is again permitted to rise. This second rising is referred to as proofing.

5. The dough is shaped and placed in the baking pans and permitted to rise for the third time. This third rising approximately doubles its size.

6. Baking — The pans of dough are moved into the ovens in an endless moving chain and proceed slowly through the oven, at a temperature of 425 to 450 degrees Fahrenheit. It takes about 30 minutes to bake the bread. As the dough heats, the yeast is killed and the gases contained in the dough (carbon dioxide and alcohol are driven off). The dough becomes firm, retaining the shape of the tiny gas pockets. This provides a bread with a light, porous texture and sweet, nutty taste.

All these steps are mechanical and automated in the modern bakery. It is interesting to note that of the approximately 25 cents which the customer pays for bread at the store, less than 5 cents is accounted for by the cost of wheat purchased from the farmer. The remainder is made up of labor, investment in milling and baking plants, profit, and materials other than flour.

**OTHER WAYS OF USING WHEAT**

While Canadians use wheat mostly as bread, we are evolving some appetite for foods developed in other lands from wheat. Pizza, made from a mixture of flour, water, salt, and yeast, has become a popular food here. In Italy it is a major wheat food form along with spaghetti.

Canadians who have travelled in India and Pakistan have developed a taste for chapati, a wheat food which looks like a pancake made from flour, salt, and water.

In China and Japan steam bread is important, although Japan is using bread similar to our own to some extent.

Wheat is still man's most important food, and the survival of mankind in this century depends on an adequate supply of the grain from which we make our daily bread.
ALBERTA WHEAT POOL

The Alberta Wheat Pool, the largest Alberta owned business in the province, was organized and built by farm people who joined to provide a market system for their own grain. The Pool was organized in 1923 after the first Canadian Wheat Board was disbanded. It began to acquire elevators in 1925 and has expanded steadily since then. At the present time the Pool operates over 500 country elevators, located throughout the grain growing areas of Alberta and British Columbia. Several seed cleaning plants and many seed warehouses are also included.

A modern Alberta Wheat Pool elevator.

Alberta Wheat Pool owns and operates a huge grain terminal at Vancouver as well as terminals at Victoria and Thunder Bay.

Alberta Wheat Pool is a co-operative, owned entirely by about 52,000 grain producers. The business is governed through an elected delegate system in which 70 delegates, from all areas served, maintain full control over its policies and operations. Earnings of the Pool are returned to the membership as patronage refunds. From its inception in 1923 to 1969, Alberta Wheat Pool distributed $63,516,000 to its membership as patronage refunds.

Alberta farmers have worked through their own organizations such as Alberta Wheat Pool, to influence grain marketing, keep grain handling charges at a reasonable level, and advise the government on many matters affecting agriculture generally. As a wholly Canadian organization, the Alberta Wheat Pool accepts a responsibility for assisting and supporting education of rural young people and has constantly sponsored educational and leadership training courses, as well as 4-H activities.

OTHER USES FOR WHEAT

Throughout this booklet, we have examined wheat as a human food. Our major cereal is important in other ways.
FEEDS

Wheat constitutes an important constituent of livestock and poultry feed in Canada and elsewhere. North American agriculture has developed a sophisticated feed industry in which livestock feeds are formulated according to the nutritional needs of the particular type of livestock being fed. Wheat may be mixed in varying proportions with barley, oats, protein supplements, appetizers, and trace elements, to provide a specialized feed for milking cows, growing pigs, broiler chickens, and others. The amount of wheat used in Canada for livestock feed is about 3½ billion pounds per year.

TRITICALE

Scientists at the University of Manitoba have developed an entirely new cereal called Triticale. Durum wheat is one of the parents, rye is the other.

Triticale may fill the need for a high yielding feed grain, which expanding markets for beef and pork will likely develop in the near future.

INTERNATIONAL AID

Wheat occupies an important place in Canada's contribution to international food aid, particularly the World Food Program organized through the United Nations. Under this program wheat is provided for human food, often used in specific projects such as road building.

World human population is expected to reach 6 billion by the year 2,000. The place of wheat as a food appears secure. Man must explore new ways to transport wheat, better ways to store it in humid climates, and more equitable ways to distribute this precious commodity to human beings everywhere.
Basuto women baking bread in earthen oven.  
Photo by A. W. Beattie.

Wheat combining in Alberta.

Threshing wheat with flails in Tanzania. Photo by J. W. Madill.