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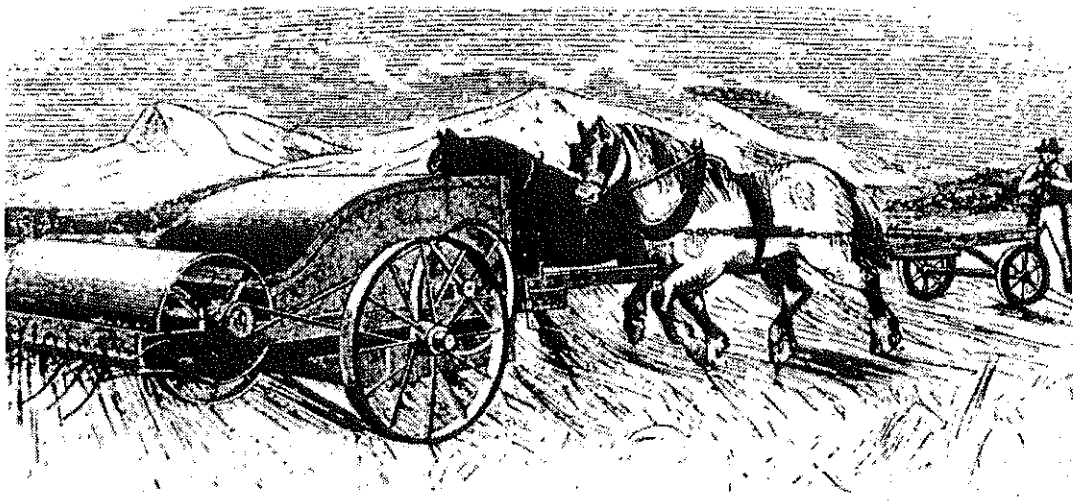
The story of wheat growing in South Australia goes back 140 years to the time when the first worthwhile crops in the colony were sown on the Adelaide Plain in 1839. Wheat was selling then at an exceptional price of 20/- per bushel.

South Australia was founded on the basis of yeoman settlers and squires who employed non-convict labour. These first settlers were English, although they were soon followed by an influx of German emigrants.

The first 18 months of settlement saw little more than experimental agriculture taking place but, as more country was surveyed and allotted to settlers late in 1838, extensive cultivation began in 1839 with 500 acres being tilled. The success of this crop led to a rapid expansion to 3000 acres in the following year, a third of which was planted to wheat. The time of seeding ranged from January to October, but scorching of later sown crops soon taught the colonists that April and May were the proper planting months.

Under an establishment program initiated by Governor Gawler in 1838, the newly cleared lands were soon taken up by the colony's unemployed and continually arriving immigrants. Such was the development of agriculture by 1844 that South Australia was self-supporting.



The original stripper-reaper of 1843 designed by Bull and manufactured by Ridley.

The Ridley Stripper

In November 1843 a breakthrough occurred in the harvesting of the grain which until then had been done by hand with a sickle and cradle. In that year John Ridley, a flourmiller, successfully operated his stripper reaper. The machine, which embodied the invention of a local farmer, John Wrathall Bull, consisted of a set of beaters working over a comb, by means of which the ripened ears of wheat were collected. Two horses pushed the machine from behind and it could reap 70 acres of wheat in seven days.

Bull and Ridley produced their inventions as a result of the serious shortage of sickle reapers and harvest workers in the 1843/44 season. They wanted to provide a mechanical reaper which would enable them, and other farmers, to avoid complete dependence on manual labour at harvest time, and to avoid risk of loss and damage while the ripened crops were being gathered over an extended period. An added advantage was the saving in labour costs, and a further incentive was the offer, at that time, of a prize of £40 for a suitable reaping machine. The expansion of wheat growing and the increasing need for such a machine is indicated by the fact that in 1843/44 wheat was grown on 14,000 acres.

Ridley did not patent his stripper, which permitted other machinery makers to take advantage of his design. The new type machine was not accepted by the farmers at first, but eventually the stripper was used increasingly through the farming areas of the colony. By 1866 it was being used in Victoria and in later years the principles of the stripper were adopted by machinery makers in other Australian colonies and overseas.

Winnowers

In 1861, such was the progress of the reaper that two-thirds of the South Australian wheat crop of 272,672 acres were stripped by this machine.

The demand subsequently grew for winnowing machines to enable the farmers to thresh grain from the harvested heads and then winnow it from the accumulated chaff.

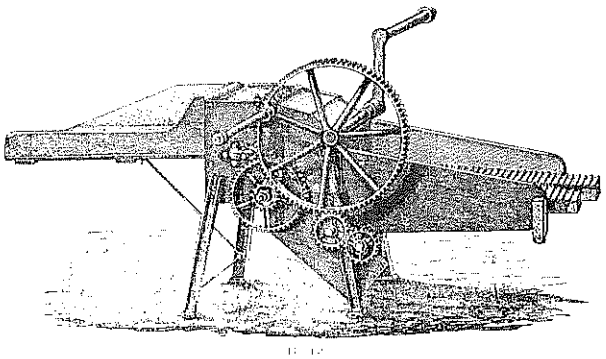
The first man to make winnowers in Adelaide was John Stokes Bagshaw who set up a workshop in 1838. He became famous for his farm tools, particularly his hand-operated winnowers of which thousands were made by his well-established business in the years up to the time of his death in 1880.

The hand winnower was the only mechanical means of threshing out the grain, until powered threshers became available towards the latter part of the 19th century, and H. V. McKay's stripper harvester, which embodied a winnower, came into production after its invention in 1884.

Operation of hand winnowers involved the farmers in wearisome, laborious, slow and dirty work, but nevertheless, they were a big improvement on the only alternatives of flails and other primitive threshing methods.

A new pickling process.

Within the first few years of wheat growing in South Australia diseases began to threaten the crops. One prominent disease was called ball smut, a fungus disease carried on the seed. Farmers quickly learned to appreciate the wisdom of pickling the seed in a brine solution to control the disease. Later it was realised that there was a better method of pickling by using a copper



Hand winnowers similar to this were constructed by Bagshaw in Adelaide.

sulphate solution (bluestone) which was first advocated by John Reynell in 1843. This practice became universal and was continued until about 1916.

Development of wheat farms.

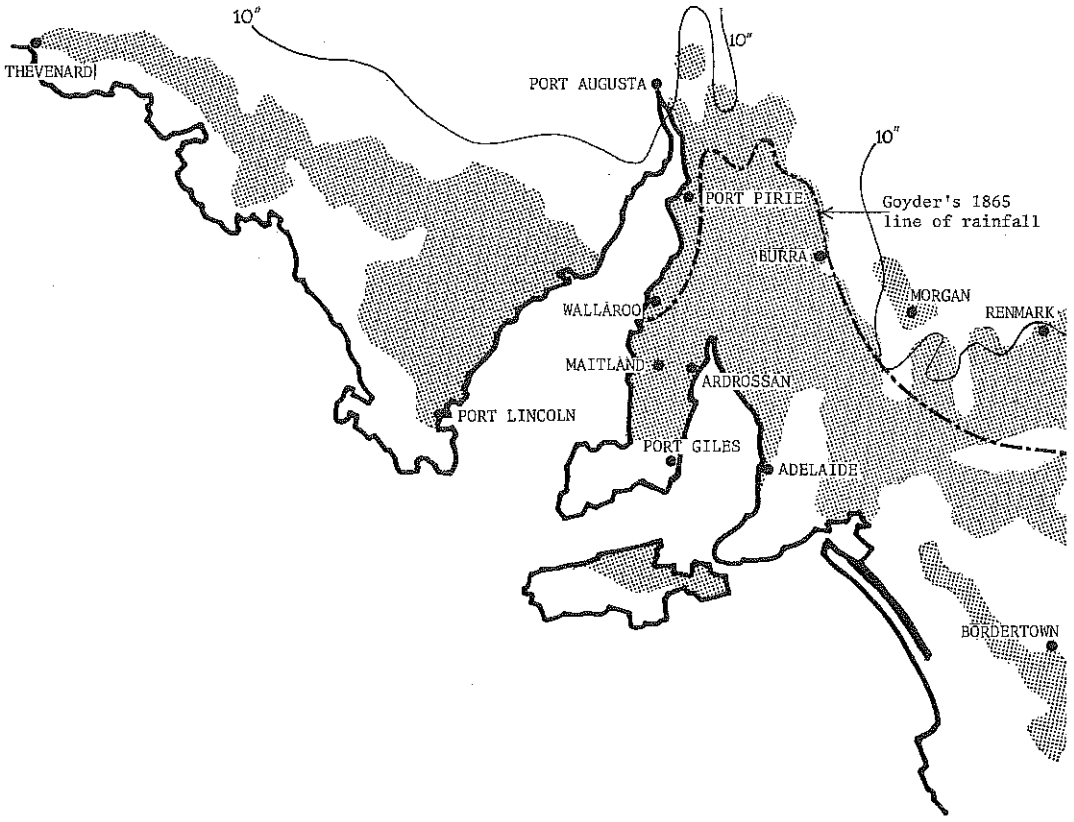
South Australia was fortunate that it did not have squatters. In New South Wales and Victoria squatters had been able to acquire grazing rights for cattle and sheep to the extent that agricultural farmers found difficulty in obtaining land to settle and develop. In South Australia as the land was required for agriculture, it was resumed by the government and sub-divided.

From the achievement of self-sufficiency in wheat production in 1844, things went well with most of the farmers in the new colony. By 1850 the area sown to wheat had increased to more than 40,000 acres, following the development of farms on the more fertile, easily cleared, soils close to Adelaide. In 1850, the local market was over-supplied, but Australian wheat was being exported to the United Kingdom following the abolition of the English Corn Laws in 1846.

In February 1851, the first of the gold discoveries was made by Hargraves near Bathurst in New South Wales and a few months later the Ballarat and Bendigo fields were also opened in Victoria. These discoveries in the Eastern colonies made a tremendous difference to the wheat industry in South Australia. But despite the fact that most able-bodied men who were free to move rushed off to the "diggings", and that there were serious shortages of labour and draught animals, wheat acreage in South Australia continued to expand and reached 162,000 acres by 1856. With smaller quantities of wheat sown in other States, particularly in Victoria and Tasmania, and the increased demands for food caused by the big expansion in the Australian population during the gold mining boom, South Australia became the virtual granary of the Australian colonies.

Development to the North.

Firm demand for wheat and attractive prices both within and outside the colony influenced a movement of new settlers towards country north of Adelaide. This area carried less timber and was cheaper to clear than the land further south where farms were first established. By the time the railway began to creep northwards from Adelaide, the Lower North areas of the colony were booming, with demand for land increasing as more men, mostly the sons of the earlier settlers, moved out from southern areas, anxious to obtain farms on the good arable land available. The railway reached Gawler in 1857, Kapunda in 1860 and pushed north to Burra by 1868. Land



The above map shows the present-day wheatgrowing areas (shaded sections) and Goyder's 1865 line of rainfall. This line bears a close relationship to the 10 inch rainfall isohyet.

settlement also extended west down Yorke Peninsula to Maitland when the copper mines at Moonta and Wallaroo developed.

An impressive achievement was the expansion of the railway system by an extra 500 miles between 1869 and 1884, under the impetus of the extension of wheat farming into the northern land areas. The railway formed a network, as the wheat belt at that time extended no more than 65 miles inland.

One of the features of wheat farms in the early years was the absence of fences, with farm boundaries being marked with pegs. This was because the timber for posts and rails was poor and the only wire available was unsuitable for sheep-proof fences. Shepherding of sheep, although common on big sheep runs, was not practicable on the typical small wheat farms.

Extending the northern frontier.

An important era in the agricultural history of the colony occurred between 1869 and 1884, when South Australia's wheat frontier was extended nearly 150 miles northwards of the limits reached in 1869. In this 15 year period due to the relentless demand for rural land, there was a total increase of 1,935,000 acres in the area of cultivated land, of which 1,823,000 acres, or nearly 95 per cent, was located in the new wheat areas opened up in the north.

The pace of rural growth can be gauged from the fact that from 1869 to 1884, exactly 100 township sites were surveyed in the new wheat growing country.

During this development period, the settlers were mainly sons and daughters of the early pioneers. They accomplished their task with a minimum amount of capital and equipment and at a cost of much hard work and suffering. The new conditions encountered were a change from those they were used to on their home farms in the south.

The background to this development was that, in 1865, at the Government's request, Surveyor-General G. W. Goyder delineated on a map a "Line of Rainfall" showing the limits of the colony's agricultural land with reliable rainfall. From 1869, criticism of "Goyder's Line" increased as settlers, seeking rural land, sought to have the Government push the wheat frontier further north. They were misled by an exceptional run of good seasons and abundant rain from 1870 to 1879. Their challenge was successful in 1874 when the Government yielded to pressure, abolished Goyder's Line, and opened the entire colony to selection of land on credit, and even refused to renew pastoral licences for land formerly regarded as sheep or cattle country.

An ill-founded notion, commonly and widely held throughout the farming community during the 1870s, was that the climate could be changed by cultivation, that is, that by some magical means "rainfall followed the plough". Another false idea was that the planting of trees in the drier areas of the colony would also increase the annual rainfall. Goyder rejected both of these ideas.

For a few seasons, good yields were obtained. However, from about 1884, the period of settlement expansion ended, and an era of stagnation commenced, which lasted into the early 1900s.

Following a spate of ruinous droughts in three successive seasons from 1880, settlers began forfeiting and surrendering land totalling 600,000 acres. In 1884 the land legislation was amended to permit the settlers to convert their farms from credit purchases to long-term leases. By 1885 land forfeitures and surrenders of land in the northern counties, above the county of Stanley

which is in the surer rainfall area, reduced the total purchased land in these north counties by nearly one and a half million acres. Goyder was proved right in refusing to alter his "line" to include regions of unreliable rainfall.

The Murray Mallee.

While land development and settlement continued in the north of the colony, in the 1860s and 70s, about three million acres of mallee scrub were made available for selection at concessional annual rates for 21 years with the rights to purchase.

One selector, who took up an area of dense mallee scrub at Wasleys in 1868, was Charles Mullen who by 1876 had developed a system of land clearance which involved rolling and cutting the standing timber and bushes, and burning it off at a later stage. Mullen scratched in his crop with a home-made harrow, and after reaping, burnt the straw and scorched the mallee shoots, which thus made the land available for the next season's crop. After several seasons the mallee stumps died. This practice spread throughout southern Australia and led the way for the clearance of millions of acres of mallee scrub. Mullen pioneered his idea after he had built a scrub roller out of a discarded steam boiler. Some of the very strong mallees had to be "nicked" or axed down before rolling. Other settlers used many types of rollers, most of which were made from tree trunks. The popularity of the Mullenising method was due to the reduced cost of land clearance because it avoided expensive, time absorbing, and arduous grubbing of the stumps.

The development of the Murray Mallee was also helped by the invention of the stump jump plough in 1876 by R. B. Smith who farmed north of Maitland. This plough was fitted with hinged beams to force the plough share back into the soil after it had jumped over the stump.

Smith was unable to patent his invention, and this permitted others to manufacture stump ploughs, some of which were of improved design. Stump jump ploughs permitted farmers to cultivate large areas of mallee scrub country which could not otherwise have been farmed. The cost of grubbing stumps was then between two and seven pounds per acre, which was more than the market value of the land.

Improved wheat varieties.

In the earlier years of the colony the wheats grown were obtained from England where the climatic and soil conditions were quite different to those of South Australia.

As early as the 1860s, there was considerable activity among farmers in selecting grain from the heads of new and improved varieties of wheat plants noticed in the crops during reaping. While most of these new varieties were not exceptional, they did contribute to an overall improvement in South Australian wheats by reason of added rust resistance, improved yields and improved adaptability.

Three farmers who were noted for selections from their crops were Ward, Gluyas, and Steinweidal.

In 1890 Richard Marshall, a farmer at Wasleys, crossed one of Ward's selections, "Ward's Prolific", with a "purple straw" cultivar to produce "Marshall's No. 3". This became one of Australia's leading varieties at the turn of the century.

New farming practices.

During the 1880s, many farmers realised that the low wheat yields in the more reliable rainfall districts to the south of the northern lower rainfall areas, were caused by the land quickly losing its fertility, rather than the lack of favourable weather conditions.

Following a disastrous attack of red rust in the wet, warm spring conditions of the 1867 - 68 season, which ruined many wheat crops, a Royal Commission was appointed to enquire into the disease of cereals. Answers to the Commission's questionnaires revealed that almost all farmers sowed wheat after wheat continually on the same paddock, at least, every two or three years. Although some farmers appreciated the benefit of fallowing before sowing, and the value of rotational cropping, most of them were ignorant of correct practices and needed agricultural education.

Many years of increasing anxiety, during which some farmers sold what they considered were their "worn out" farms and moved to others, culminated in the appointment of a Commission on Agricultural Education in 1875. Its recommendations included the formation of a Department of Agriculture, the appointment of a Professor of Agriculture, and the establishment of a model farm near Adelaide and other experimental farms.

After considerable delays, Professor D. Custance was appointed as the recommended Professor and arrived in 1881. As a result of soil testing, he became convinced that a severe shortage of phosphate in South Australian soils was the prime cause of crop failures. In 1886, after four years of careful experimentation, he recommended superphosphate as the cheapest and best manure for wheat crops. Professor William Lowrie, who, in 1887, succeeded Custance, demonstrated the value of the fertiliser and popularised its use during his time at the new Roseworthy Agricultural College from 1888 to 1901. He earned the tribute that "no other man in South Australia had done more to make farming pay". Superphosphate made possible the opening up of the Murray Mallee lands to wheat growing and later those of Eyre Peninsula. Lowrie was a strong advocate of crop rotation and urged the practice of cultivating early and well-worked fallows to conserve moisture and eliminate weeds from crops. His teachings were widely adopted, being aided by an increased availability of better cultivation implements.

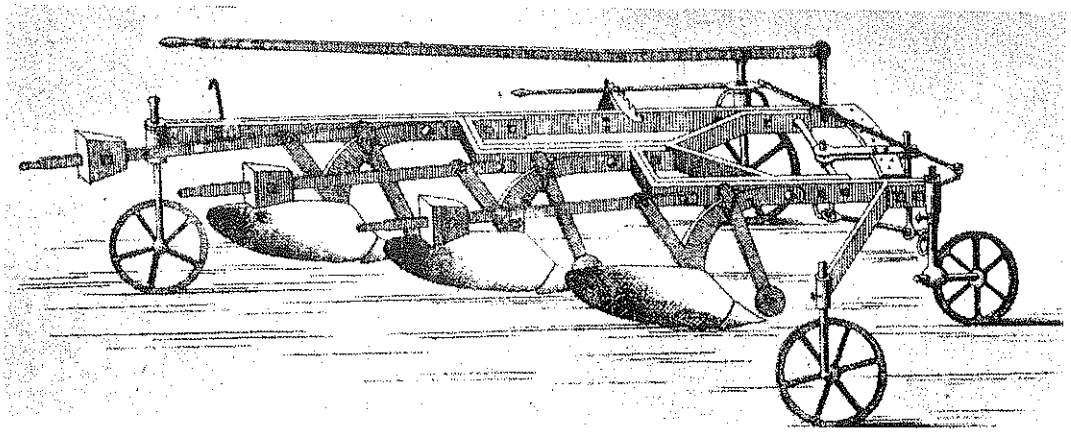
Although wheat crops were reasonably good over the more reliable agricultural areas, from 1910 onwards disturbing symptoms of future trouble were becoming evident. Many farmers noticed that their wheat yields were declining, despite well worked fallows and continued use of superphosphate, together with the sowing of improved wheat varieties. The long period of exploitive farming allied to the burning of stubbles, which prevented organic matter build-up in the soil from the rotting of the straw, was beginning to have its effect. There was a great need to increase soil nitrogen, and to arrest soil erosion on many properties by the construction of contour banking to prevent soil run-off through water action. Nitrogenous manures were too expensive. Subsequent events were to prove that legume-based pastures provided the best answer to declining nitrogen levels and soil erosion.

The story of the use of annual legumes in Australia goes back to 1889 when A. W. Howard, who owned a farm at Mount Barker, discovered subterranean clover growing on a neighbour's farm at Blakiston and later on his own property. Howard pioneered the use of this plant as a pasture and improver of the soil. In 1923, his son, Cecil Howard, developed and expanded the harvesting system of recovering clover seed from the soil. Sub-clover, which derives its name from its habit of forcing most of its seeds into the soil whilst in the ripening stage, and which requires superphosphate for satisfactory growth, proved to be of inestimable worth in developing the sheep and cattle industries, and in enriching the soil with nitrogen for cereal crops on neutral to acid soils. Medics were also of value in this regard.

Pickling and grading of wheat.

In 1915, Alf Hannaford, a 24 year old farmer from Riverton, South Australia, made the first mechanical wheat pickler. By the agitation of a solution of copper sulphate (bluestone) or of formalin, the machine enabled the wet pickling of seed wheat as a protection against the fungus disease known as bunt or stinking ball smut. Before then farmers had manually performed the back-breaking task of plunging bags of seed wheat into two containers or barrels of hot solutions of different temperatures, and then dried the grain.

Hannaford changed the design of the machine in 1922 to enable



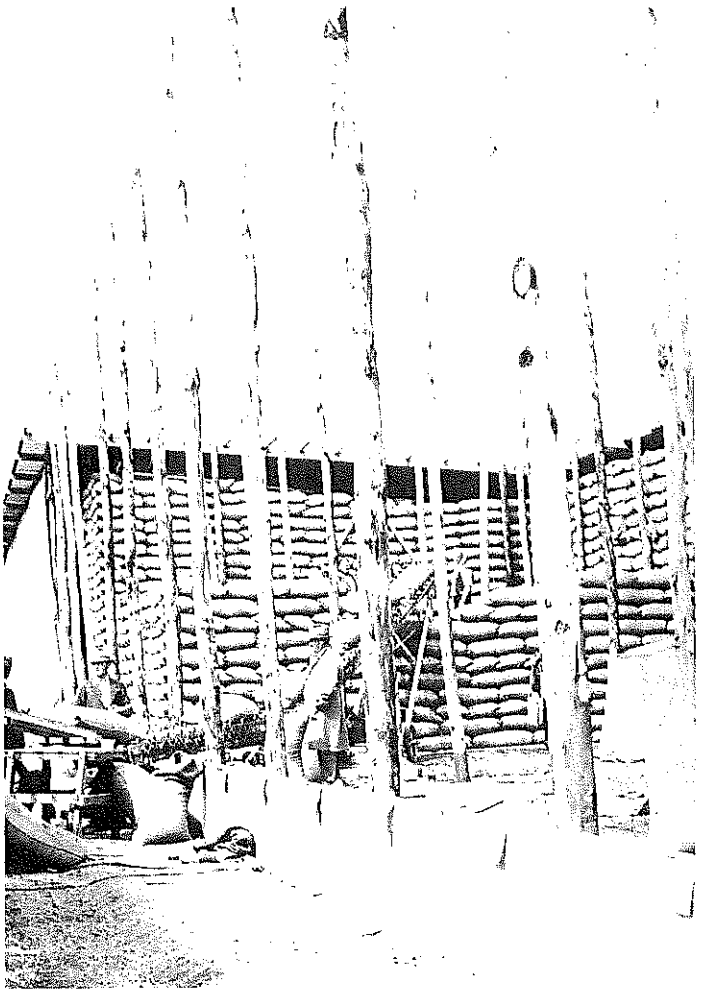
The first stump-jump plough invented by R. B. Smith of Kalkabury, South Australia in 1876.
(By courtesy of the Royal Agricultural and Horticultural Society of South Australia)

dry pickling with copper carbonate, to give better protection against smut. This method has since been replaced with other types of pickles based on improved chemical compounds.

When the financial depression hit the farmers in 1929, they could not afford to buy pickling machines. Hannaford met the situation by hiring his equipment out and at about the same time he commenced a service on the farms of seed grading, to clean out foreign seeds from the wheat, barley and oats, combined with pickling. The convenience and acceptable cost of these services resulted in wide-spread engagement of Hannaford for grading and pickling on farms both in South Australia and in other States. Contract pickling and grading is now a permanent feature of Australian agriculture.

The 45 year period from 1896 to 1941 saw big changes in the wheat industry in South Australia which reflected the impact of agricultural education. Factors which influenced the beneficial changes were:

- Advocacy of superphosphate and the adoption of early and well-worked fallows of wheat lands. By 1910 - 11 super was used on 80 per cent of the wheat sown.
- Selection of improved varieties of wheat.
- Efforts to control wheat diseases, such as rust and smut.
- Availability of improved farm implements, such as the harvester invented by H. V. McKay in 1884 in Victoria.



The handling of bagged wheat at Kadina (SA) before the bulk handling era beginning in the 1950s.

The F.A.Q. sample.

South Australian wheat merchants and exporters originated in 1888 what was later to be known as the Fair Average Quality (F.A.Q.) system of marketing wheat. Known firstly as the Standard Sample method, the merchants responded to buyer requests to adopt a system which would indicate the quality of wheat of the respective seasons.

The F.A.Q. system was adopted by Victoria in 1891, by New South Wales in 1899 and by Western Australia in 1905 and served as the widely recognised method of marketing Australian wheat for upwards of 86 years until the Australian Wheat Board, from the 1974/75 season replaced the F.A.Q. name with the term Australian Standard White.

The F.A.Q. system involved the collection of a representative sample of wheat, from every delivery point in the State from which the wheat was to be exported. The quantity of wheat used was proportionate to the total seasonal deliveries at each receival point. Samples were thoroughly mixed to obtain a fair average sample as a basis on which sales of wheat for the relevant season would be made. By means of a chondrometer, the density of the wheat in the sales sample was then determined, which was known as the "bushel" or test weight.

A weakness of the system was that prices payable by buyers were no higher for wheat supplied which was better than the standard sample, and thus did not provide an incentive to farmers to thoroughly clean out foreign matter and unmillable material from their wheat before marketing it.

Marketing and bulk handling.

Early in the 1900s widespread dissatisfaction existed amongst wheatgrowers with the method of marketing wheat in South Australia. Many farmers depended almost entirely on wheat for their income, as, on the smaller farms, very few sheep or other livestock were kept. Farmers were convinced that they were handicapped compared with farmers in the Eastern states, and that financial returns from the sale of their wheat were too low.

A Royal Commission, appointed in 1908, to investigate methods of marketing wheat in South Australia, reported that a lack of competition existed between wheat buyer merchants because they had reached an "honourable understanding" between themselves to protect their interests, which enabled them to exploit the unorganised farmers. In spite of the Royal Commission's finding that merchants and millers were "farming the farmers", no effective reforms resulted. The Commission acknowledged the virtues and possibilities of a bulk handling system for grain, but found that the apathy of growers, an unfriendly attitude of wheat shippers, and high establishment costs were factors against acceptance.

In 1914 - 15 a comprehensive scheme for bulk handling of grain, prepared by Canadian consultants, Metcalf and Co. Ltd., failed to get Parliamentary approval.

During World War I an Australian Wheat Board was appointed with powers to operate compulsory wheat pools and to take sole responsibility for marketing wheat. Such pools were conducted from 1915 - 16 to 1920 - 21 inclusive. A voluntary co-operative pool, which was formed in South Australia after that war ended, although initially popular as indicated by the fact that 36 per cent of the State's marketable wheat was handled by the pool in 1921 - 22, increasing to 60 per cent in 1930/31, failed in the 1930s because of merchants' competition.

An attempt in 1922 by a local co-operative company of farmers entitled "Farmers Bulk Co-op. Ltd." to get approval for Parliament to establish bulk handling was also unsuccessful.

It was several more years before farmers first moved to unite and fight for their rights. At a meeting at Borrika in the South Australian Murray lands, in 1927, the S.A. Wheatgrowers Protection Association was formed, later to become the S.A. Wheat and Woolgrowers Association.

The Association resolved that bulk handling facilities be provided for wheat in South Australia. In that year, the Parliamentary Standing Committee on Public Works was requested to investigate a State bulk handling system for grain and reported in 1934 with a favourable recommendation, but it did not gain Parliament's support. There was further unsuccessful attempts to obtain enactment of bulk handling by the State Parliament, and it was not until 1955, that the Bulk Handling of Grain Act was passed, and a co-operative company of wheatgrower members, known as S.A. Co-operative Bulk Handling Ltd., was incorporated.

The practical demonstration of the successful operation of a bulk export silo at Ardrossan by the Australian Wheat Board, which was opened in November, 1952, and also used the Broken Hill Pty. Ltd. to load overseas vessels, was a crucial factor in influencing the introduction of the bulk handling system for grain in South Australia.

These historical notes were compiled by the Australian Wheat Board from the following references:

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