DOMINION OF CANADA

DEPARTMENT OF AGRICULTURE

DOMINION EXPERIMENTAL FARMS

EXPERIMENTAL STATION

SWIFT CURRENT, SASK.

REPORT OF THE SUPERINTENDENT

J. G. TAGGART, B.S.A.

FOR THE YEAR 1923

Excavating for a trench silo. A chain is used on the plough in order to keep the walls perpendicular.

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1924

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EXPERIMENTAL STATION, SWIFT CURRENT, SASK.

REPORT OF THE SUPERINTENDENT, J. G. TAGGART, B.S.A.

THE SEASON

The spring of 1923 was slightly later than the average, but much earlier than in 1922. Work on the land was well started in the district by the middle of April and a considerable amount of seeding was done before the end of that month.

The spring season until near the end of May was exceedingly dry. This facilitated seeding but delayed germination in fields where little moisture was held. Fortunately there were few heavy wind storms during this period of dry weather. It is an interesting fact that the highest temperature of the year (90.5° F.) occurred in May. This temperature was accompanied by a strong wind from the southwest.

The end of May witnessed the beginning of one of the wettest seasons this district has experienced since records have been kept. The heavy rains of June and early July, accompanied by moderately high temperatures, caused a phenomenal growth of all vegetation. By the middle of July crops appeared to be at least ten days nearer to maturity than at the same time in 1922.

On July 21, crops on the southeast quarter of the Station were damaged by hail to an extent varying from 10 per cent to 60 per cent. As might be expected, fall rye, which was almost ripe, suffered most serious damage. It was again observed that fodder crops such as corn, millets and grasses were much less seriously injured than grain crops. Among the fodder crops sunflowers were most damaged and made the poorest recovery. The crops which were growing on the west and north sides of the Station were not hailed to any extent, but the oats and wheat were lodged by the wind and rain which accompanied the hail.

The hailstorm and subsequent damp weather delayed the ripening of the grain crops and promoted the development of wheat stem rust. The damage resulting from the rust varied widely. Many fields entirely escaped injury, while others, which were on low land or for other reasons were late in ripening, were seriously damaged.

Harvesting of spring grains began on August 17. From that date forward the weather was almost continuously fine and dry. The harvesting and threshing season of 1923 was one of the best ever experienced in this district. The fine weather continued with few interruptions until the last day of November, when the temperature dropped and there was an eight-inch fall of snow. Within a few days the weather became mild again and continued so until the end of the year. The open fall was very favourable to the completion of farm work, and to the live stock which pastured in the stubble fields.

METEOROLOGICAL RECORD

For Swift Current, Sask., 1923

Month	Temperature F.		Precipitation	Sunshine
	Highest	Lowest	rain	
	°F.	°F.	ins.	hours
January	.....	−19·0	0·8	115·25
February	.....	−40·0	1·05	144·0
March	48·0	−18·0	1·2	150·5
April	79·0	− 2·0	0·64	224·1
May	90·5	20·0	2·00	215·9
June	88·0	42·0	7·01	224·0
July	89·0	46·0	3·87	236·8
August	88·0	33·0	1·41	269·9
September	87·0	31·0	0·02	219·0
October	74·0	9·0	0·39	192·6
November	59·0	0·0	0·44	106·0
December	46·0	−31·0	0·45	95·1
Total	.....	.....	19·28	2,193·05

Last spring frost—May 10.
First fall frost—September 9.
Frost free period—132 days.
Rainfall during May, June, July—12·88 inches.

DATES OF FARM OPERATIONS—1923

—	Began	Finished
Work on land (first and last dates)	April 16	Nov. 9
Seeding wheat	April 19	May 5
Seeding oats	May 8	May 22
Seeding barley	May 25	May 25
Seeding fall rye	Sept. 4	Sept. 7
Seeding sunflowers	May 24	May 27
Seeding corn	May 22	May 30
Seeding sweet clover	May 28	May 28
Spring ploughing	April 27	May 8
Ploughing summer-fallow	June 15	July 20
Breaking prairie sod	May 22	July 8
Cutting wheat	Aug. 23	Sept. 7
Cutting oats	Aug. 17	Sept. 11
Cutting fall rye	July 28	Aug. 7
Cutting barley	Aug. 14	Aug. 14
Operating combine	Sept. 6	Sept. 8
Cutting corn	Sept. 12	Sept. 18
Cutting sunflowers	Sept. 19	Sept. 27
Filling silos	Sept. 12	Sept. 27
Threshing	Sept. 22	Oct. 13
Fall ploughing	Nov. 7	Nov. 9

ANIMAL HUSBANDRY

HORSES

In March, 1923, two five-year-old colts were purchased and broken, thus bringing the total number of work-horses up to fourteen. Of this number, however, two are now so old that they will probably not be used another season. In addition to the work-horses there are four colts not yet broken. Two of these are rising four and will be broken early in 1924 so as to be ready for next season's work. The other two colts are rising three and two years, respectively. As an indication of the low cost of raising colts in this district, it might be stated that these colts have not been stabled since they were received from Indian Head. In the summer they were pastured on prairie grass, and in the winter most of their living was obtained from the stubble fields. A few oat sheaves were fed during the coldest weather. The feeding was done out of doors where the only shelter was straw stacks.

With the work-horses, the rule is followed of turning out all that are not actually needed for winter work. They spend the winter in the fields and are fed only if heavy snow or ice makes it impossible for them to clear the ground by pawing. Experience indicates that horses wintered outside, provided they are not starved, are in much better shape for spring work than horses that are stabled and fed inside. It has been found next to impossible to keep the feet of stabled horses from drying up and contracting during the winter, while the horses that are running out have no trouble of this sort.

CATTLE

The shorthorn herd now consists of one bull, eight cows, five heifers and six calves. The calves were all born in the months of September and October, 1923.

The cows spent the winter of 1923 in a straw shelter. With one exception, calves were allowed to run with the cows because of the lack of facilities for milking and caring for milk. The feed for the cows consisted of corn ensilage, oat straw, rye hay, with a daily allowance of 6 pounds of oat chop to the cows that were feeding calves. Dry cows and young stock received very little grain. These rations maintained the cows in good condition. During the summer all the cattle were pastured on prairie grass and a mixture of fall rye and oats, seeded in the spring. This mixture seeded at the rate of two bushels of oats and one of fall rye per acre, yielded an abundance of pasture until late in August. From that time on, the cattle were fed ensilage which had been carried over the summer in the bottom of the upright silo.

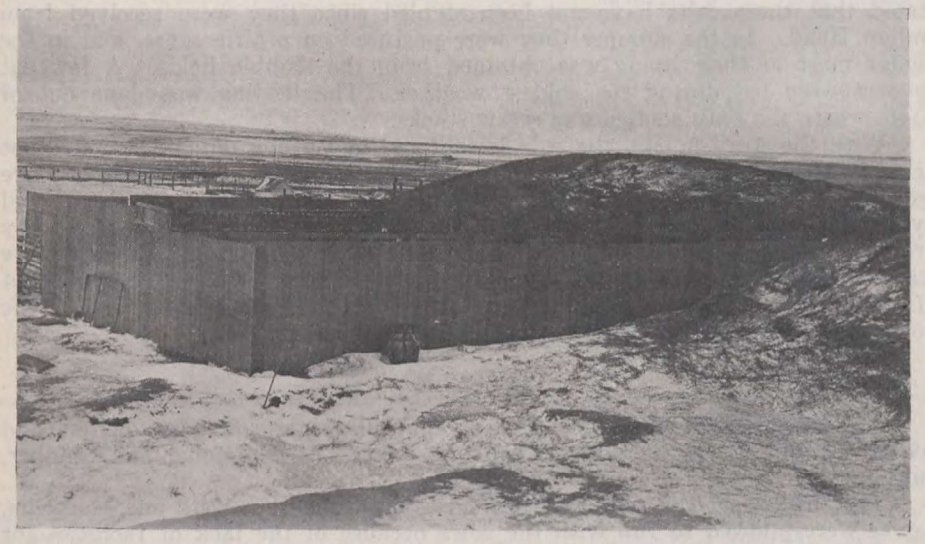
As the cows freshened they were stabled, and fed ensilage, sweet clover hay, oat straw, bran, and oat chop. The average daily ration per cow is as follows:—

Ensilage	30 pounds
Sweet clover hay	15 pounds
Oat straw	ad lib.
Bran	2 pounds
Oat chop	6 pounds

The amount of bran and oat chop fed depends on the milk flow. Approximately one pound of grain is fed for each four pounds of milk produced. Careful record is kept of the amount of feed consumed by each cow as well as the amount of milk produced. Since none of the cows has gone more than three months on this lactation period, it is impossible to give any statement of feed consumption and milk production.

STEER FEEDING

Forty head of two-year-old grade Hereford steers were purchased in order to utilize the abundant corn and other fodder crops produced on the Station. These steers were allowed to run on the stubble fields until the first of December, when they were placed in the corrals for winter feeding. They were divided into two lots, lot 1 being composed of steers of good beef type and these were very uniform and weighed 800 pounds when weighed into the corral, while lot 2 comprised rougher and more upstanding steers which average 784 pounds in weight. These lots are to be compared on the basis of economy of gains and profitableness of feeding on the completion of the test.



Steer feeding corral and straw shelter.

The daily ration at present being fed to all steers is 35 pounds of corn silage, oat straw ad lib. and five pounds of a meal mixture composed of equal parts of oats and barley chop. This ration, particularly the meal, will be increased as the period advances. An abundance of water and salt is provided.

FIELD HUSBANDRY

In 1922 the field husbandry report consisted very largely of an outline of experimental work which had just been established; little data could be given. In this report it will be possible to give results of a number of experiments, as well as to describe new experiments started this year.

SINGLE YEAR RESULTS NOT DEPENDABLE

It is well known among those who conduct experiments in agriculture that the results of any single year's work may be wholly misleading when compared with the average of a period of from five to ten years' work. It is important, therefore, to warn the readers of this report that they should not attempt to draw definite conclusions from data here presented. The results are published as they are obtained each year so that those who are interested in the experiments may have a permanent record of the work done.

AREA IN PLOTS

The area devoted to plot work in field husbandry cereals and forage crops has been more than trebled, so that it now exceeds sixty acres. Part of the increase in area is due to the fact that many experiments which were started in single plots with checks at regular intervals, have been seeded in triplicate plots. This change has been made with a view to increasing the reliability of our plot experiments.

A considerable increase has been made in the number of experiments dealing with the production of corn. Dates of planting, rates of planting, spacing, rows and hills, cultural methods, methods of planting, the relation of corn to other crops, are all matters upon which either new experiments have been started or old experiments have been expanded.

In the experiments dealing with cultural methods for wheat the number of fallow treatments has been increased from six to eighteen, and number of stubble treatments from eight to eighteen. The number of experiments dealing with methods of seeding grasses and clovers has been doubled and a further increase in this work is contemplated for 1924.

1923 RESULTS OF FIELD EXPERIMENTS

In the 1922 report it was pointed out that since the field experiments had only been laid down in that year no results were available. In 1923 results were obtained from all field experiments excepting the fallow treatment experiment. The first fallow treatments were given this year so that results will be available next year. In the following pages are presented the 1923 results.

PRODUCTION OF WHEAT FOLLOWING DIFFERENT STUBBLE TREATMENTS

The experiment is carried on by means of a rotation, fallow, wheat, wheat. Stubble land from the first year is divided into eight plots which receive different treatments in preparation for seeding second year wheat.

The yields of the plots are used for comparison.

In 1923 the highest yielding plot received the treatment: spring burn, disc, seed and harrow. The lowest received spring disc, seed and harrow. With only one year's results available, however, the differences are not great enough to be significant.

PRODUCTION OF WHEAT ON PACKED AND UNPACKED LAND

In the packer experiment, the same general methods are followed as in the stubble treatment experiment; the only variable factor in the treatment is the use of the packer. The results so far are inconclusive.

ROTATION SUMMARIES

SEVEN-YEAR ROTATION SUMMARY, 1923

Crop	Yield per Acre	Value	Cost of Production	Profit or Loss (−)
		$ cts.	$ cts.	$ cts.
Corn	9 tons	31 50	23 79	7 71
Wheat (Kubanka)	22·3 bush.	16 73	10 82	5 91
Hay (failure). Oats for green feed (sub.)	1·6 tons	11 60	9 38	2 22
Pasture and fallow				
Wheat (Kubanka)	20·3 bush.	15 23	10 52	4 71
Fallow (rye seeded)				
Fall rye (60 per cent hail damage)	16·6 bush.	8 30	14 78	−6 48
Aggregate		83 36	69 29	14 07
Average per acre		11 91	9 90	2 02

THREE-YEAR ROTATION SUMMARY

Crop	Yield per Acre	Value	Cost of Production	Profit
	bush.	$ cts.	$ cts.	$ cts.
1. Wheat	29·3	23 44	17 54	5 90
2. Oats	57·4	17 22	13 13	4 09
3. Fallow—Cost to be charged against 1924 Wheat crop				
Aggregate		40 66	30 67	9 99
Average per acre		13 55	10 22	3 33

The three-year rotation of wheat-oats-fallow shows an average profit per acre of $3.33. This figure applies to the area under fallow as well as to the cropped area. The cost of summer-fallowing field 1 in 1922 is charged against this year's wheat crop. Similarly the 1923 costs on field 3 will be charged to the 1924 crop.

The two-year rotation, wheat, fallow, shows an average profit of $3.18 per acre. The crop was damaged approximately 20 per cent.

The two-year rotation, fall rye, fallow, shows an average loss of $3.49 per acre. The crop was damaged approximately 60 per cent. Even had the rye produced a full crop, it would probably still have shown a loss.

COST OF PRODUCTION

PRODUCTION COSTS—WHEAT ON SUMMER-FALLOW

Area of field—12 acres. Rotation: Wheat—wheat—fallow

Rent of land, 12 acres, 2 years at $2.40 per acre	$ 57 60
Use of machinery, 12 acres, 2 years at $1 per acre	24 00
Ploughing, 1922, man and 5 horses, 24 hours at 80 cents	19 20
Cultivating twice, 1922, man and 6 horses, 14 hours at 90 cents	12 60
Harrowing, 1923, man and 4 horses, 4 hours, at 70 cents	2 80
Seeding, man and 4 horses, 6 hours at 70 cents	4 20
Cutting, man and 4 horses, 8 hours at 70 cents	5 60
Stooking, man 12 hours at 30 cents	3 60
Threshing, 360 bushels at 15 cents	54 00
Twine, 40 pounds at 16 cents	6 40
Seed, 15 bushels at 90 cents	13 50
Total cost for 12 acres	$203 50

Yield per acre, 30 bushels.
Cost per acre, $16.96.
Cost per bushel, 56½ cents.

PRODUCTION COSTS—WHEAT FOLLOWING WHEAT

Area of field—12 acres. Rotation: Wheat, wheat, fallow

Rent of land, 12 acres at $2.40 per acre	$ 28 80
Use of machinery, 12 acres at $1 per acre	12 00
Ploughing, man and 5 horses, 24 hours at 80 cents	19 20
Harrowing, man and 4 horses, 4 hours at 70 cents	2 80
Seeding, man and 4 horses, 6 hours at 70 cents	4 20
Harrowing, man and 4 horses, 4 hours at 70 cents	2 80
Cutting, man and 4 horses, 8 hours at 70 cents	5 60
Stooking, man 12 hours at 30 cents	3 60
Threshing, 254 bushels at 15 cents	38 10
Twine, 30 pounds at 16 cents	4 80
Seed, 15 bushels at 90 cents	13 50
Total cost for 12 acres	$135 40

Yield per acre, 21·16 bushels.
Cost per acre, $11.28.
Cost per bushel, 53·3 cents.

COST OF PRODUCING CORN

Corn on oat stubble.	Area of field — 6 acres.
Rent of land, 6 acres at $2.40 per acre	$ 14 40
Use of machinery, 6 acres at $1 per acre	6 00
Ploughing, man and 5 horses, 12 hours at 80 cents	9 60
Double disking, man and 6 horses, 4 hours at 90 cents	3 60
Harrowing, man and 4 horses, 2 hours at 70 cents	1 40
Seeding, man and 4 horses, 3 hours at 70 cents	2 10
Cultivating twice, man and 2 horses, 15 hours at 50 cents	7 50
Hoeing, man, 34 hours at 30 cents	10 20
Cutting, man and 3 horses, 7·5 hours at 60 cents	4 50
Ensiling, 49·5 tons at $1.44 per ton	71 28
Seed, 1·5 bush. at $2.50 per bushel	3 75
Twine, 18 lbs. at 16 cents	2 88
Total cost for 6 acres	$137 21

Yield per acre, 8·25 tons.
Cost per acre, $22.87.
*Cost per ton in the silo, $2.77.

*NOTE.—The cost of fodder corn would be $2.77 less $1.44 (the cost of ensiling) plus the cost of stooking or stacking. The latter operation would cost less than half as much as ensiling, so that fodder corn would not cost more than $2.10 per ton, green weight. Three tons of green corn would be equivalent to about one ton of good hay in feeding value. An acre of corn yielding 8·5 tons at a cost of $16.80 would be equal to 2·8 tons of hay at $6 per ton.

COST OF PRODUCTION SUMMARY

It must be remembered that the costs given in the tables are in no way regarded as permanent values. Costs vary from field to field and from year to year, depending on a great variety of factors. The yield per acre is the most variable factor, and it is usually the factor which determines whether crops are produced at a profit or at a loss.

CULTURAL EXPERIMENTS

CULTURAL TREATMENTS OF CORN

Spring ploughed land, disked and harrowed prior to planting, was used in this experiment. The corn was planted on May 28 with an ordinary grain drill, with the runs spaced to seed rows 42 inches apart, and the seed spaced as near as possible on an average of 8 to 10 inches in the row.

One plot was cultivated once each week and hoed as required, another received no cultivation but weeds clipped with a hoe, a third was cultivated as required and no hoeing, and a fourth received no cultivation, no hoeing, and weeds allowed to grow. Plots were each one-eightieth acre and were repeated three times.

So far the results indicate that the little gain made by very frequent cultivation does not warrant its cost. Weeds seem to be the worst enemy of corn, and just sufficient cultivation at the right time is an important factor in the production of corn for either fodder or seed.

DATES OF PLANTING CORN

Corn was planted with an ordinary grain drill in rows 42 inches apart on May 1 and on every ten days afterwards until June 9.

Plots one-one hundred and sixtieth acre repeated four times. No early frosts occurred, to give any set-back to early sowings. At the earliest part of the season, the corn sown on May 1 looked much more promising than any of the later sowings, but towards the end of the season the difference was not so noticeable. However, the results for this year favour early sowing.

DATES OF PLANTING SUNFLOWERS

Russian Giant sunflowers were sown in rows 42 inches apart on May 1 and on every ten days following until June 9. Plots one-one hundredth and sixtieth acre repeated four times.

For the first few weeks the earliest planting gave most promise, but this difference became less marked toward the end of the season when compared with the two plantings immediately following. The last two plantings appeared to be at a considerable disadvantage.

RATES AND DATES OF SEEDING FALL RYE

Fall rye was seeded on duplicate $\frac{1}{40}$-acre plots at various dates, beginning July 15 until October 1, 1922, and at rates varying from $\frac{1}{2}$ to $1\frac{1}{4}$ bushels per acre.

All plots were seriously damaged by hail on July 21, 1923. Prior to the hailstorm it was evident that all early sown plots would produce a very small yield. September seeding far exceeded earlier dates in thickness of stand, resistance to winter killing and yield.

The various rates of seeding showed no consistent difference.

TESTS OF FARM MACHINERY

Owing to the fact that new or modified implements are being constantly offered to farmers with the assurance that these implements are much superior to anything now in use, it has been decided that this Station shall purchase and test a limited number of machines in order that farmers may have some concrete facts upon which to base their judgment when contemplating the purchase of such machines.

Machines which are being submitted to special tests may be divided into two groups. Group 1 includes machines which, if used by the farmer, would radically change his method of producing crops. Group 2 would include machines which are claimed to have the virtue of enabling the farmer to more cheaply and more efficiently follow the production methods which are now in common use.

Under group 1 would come such implements as the "Combine" and the corn lister, while group 2 would contain various special and modified types of cultivators, harrows and seed drills.

When testing an implement which falls within group 1 it is necessary not only to make some determination of the mechanical efficiency of the implement, but to carry out trials which will enable one to decide as to whether or not the change in method involved in using the machine would be advantageous or otherwise under our conditions. Before any decision can be reached regarding the wisdom of changing established methods, tests must be conducted over a period of years, in order that the method will be under observation in all the variety of seasonal conditions which may occur; therefore conclusions regarding the usefulness of implements which are classified in group 1 cannot be reached in a short time. On the other hand, when the machine under test does not necessitate any radical change in methods, and only the question of mechanical efficiency is under consideration, one season's test may be conclusive.

It should be clearly understood that while this Station is carrying on tests with implements these tests are neither for the purpose of promoting the sale of machinery to farmers nor to induce farmers to decrease their equipment of machinery. The implement tests at this Station are solely for the purpose of arriving at reliable conclusions as to the wisdom of farmers using the machines in question.

STUBBLE BURNER

This machine, as its name implies, is for the purpose of burning stubble and weeds. It was purchased in May of 1923 from the Prairie Implement Company, Regina, at a cost of $250.

The fuel used in this machine is what is commonly described as "Fuel Oil." In operation the burner resembles a large torch; the fuel is fed into the burner under pressure and after the flame is well started its heat vaporizes the incoming fuel so that at the point of exit from the burner the fuel is in a gaseous state.

The machine consists of a triangular frame upon which is mounted (*a*) a twenty-gallon fuel storage tank; (*b*) a four-gallon pressure tank; (*c*) a pump operated by the traction of the wheels, for forcing the oil from the storage to the pressure tank against a pressure of from 100 to 125 pounds per square inch; (*d*) fuel vaporizing coils and flame spreader. This latter part of the machine is carried across the rear end of the frame. It can be adjusted to heights varying from three inches to ten inches from the ground. The flame spreading device covers a total width of twelve feet.

The testing of this machine has aroused considerable interest among farmers because of the well-known fact that good crops, free from weeds can frequently be raised on land where the stubble of the previous crop has been burned. The difficulty that farmers have experienced in the last few years is that they have been unable to get a "clean burn," and consequently could not depend upon this method of removing weeds from second and third crop land.

It should be remembered however, that some authorities are averse to the practice of burning stubble because of the loss of organic matter and plant food. Some farmers also take this view and do not attempt to burn.

Our tests include not only an investigation of the merits and defects of the machine we are using, but also experiments for the purpose of determining the effect on cost of production and yield of wheat of burning stubble, as compared with not burning. Considerable information is already available on this subject in the published reports of other western experimental farms and stations.

The first question is, will the machine burn the stubble and weeds? The answer is, yes; unless the stubble is very short and thin or badly tramped by stock. Where Russian thistle is the chief form of vegetation and the stubble is scanty, the thistle is not always completely burned. It is sometimes necessary to drive very slowly or even to stop in order to ignite some weeds.

What does it cost per acre in time and fuel to operate the machine? The answer to this depends on conditions. When operating in stubble in which a fire will run and burn clean for any considerable distance the cost of operating the machine is very small. The cost may be as low as 20 cents per acre. In fields where the stubble is so thin that even a fire started by the burner will not run beyond the ground over which it passes, the cost may be as high as $1.50 or even $2 per acre. In many instances we have used as high as five gallons of fuel oil per acre, costing 25 cents per gallon, or $1.25 per acre. Some times the fuel consumption would fall as low as three gallons per acre but never below that amount unless the burner was being used in a field where burning could have been done without its aid. Where it was necessary to cover all of the ground with the burner, the fuel used amounted to from five to six gallons per acre, and the area covered was not more than 16 acres per day. The burner can be operated by one man, using two horses.

Will the burner destroy weed and other seeds which are lying on the surface of the ground? Such seeds are only partly destroyed; the percentage we have not been able to ascertain. Many of the larger seeds and those of the smaller ones which lie in exposed positions on the field are heated sufficiently to destroy their powers of germination, but seeds which are even slightly

covered by soil, by the tramping of horses or by the wheels of implements, are not injured by the fire. We have observed volunteer grain and weeds grow up soon after the burning of stubble on fields which were known to contain no seeds of any cultivated crop excepting those dropped on the ground in the process of handling the preceding crop.

As to the destruction of the larvæ of saw-flies and the eggs of grasshoppers it is established that some grasshopper eggs are not destroyed by the burning of stubble, and it seems likely that a large percentage would escape injury. It has not been possible to make any definite observations on the effect of the fire on saw-fly larvæ, but judging by the depth to which some of them penetrate, it seems quite probable that many of them would remain alive after the burning of the stubble.

After one season's observation of the stubble burner we are not inclined to recommend its purchase by farmers. The company which is now manufacturing this machine has made some changes in its construction since the one which we are testing was purchased. It is planned to have these improvements put on to our machine and continue the tests next year.

THE COMBINE

In 1922 a fairly comprehensive report on the Combine was published. It will be unnecessary, therefore, to repeat statements already published excepting to indicate wherein the 1923 results differed from or supported those of 1922.

In 1923 the Combine harvested one hundred and twenty-five acres of wheat, all of the Marquis variety and all on summer-fallow land. In general the 1923 experience was similar to that of 1922. Conditions in 1923 were somewhat less favourable to the Combine than in the previous year. Crops were badly lodged and tangled, and there was a much greater proportion of straw to grain. These conditions slowed up the work of harvesting both with the Combine and by the usual method of binding and stooking. The Combine, however, handled the tangled crops more satisfactorily than the binder. This was, no doubt, due to the fact that the cutting mechanism of the latter is machine is power driven, while the binder knife is driven by the traction of the wheel.

This year the weather was again very favourable. There were no storms to injure or destroy the crop while it was ripening; at harvesting time the grain was so dry that no loss or injury occurred in storage.

From last year's report the impression was gathered by some that we were experimenting with the Combine for the purpose of inducing farmers generally to adopt and use it at the earliest possible date. This is most decidedly not the case. The possible objections to the Combine listed in our last year's report still stand, and until more extensive experience and trials have justified such a course, we cannot recommend that farmers generally adopt the use of the Combine.

The milling and baking tests of wheat harvested with the Combine in 1922 as compared with wheat harvested in the usual way indicate little or no difference in the two methods insofar as 1922 is concerned. The 1923 tests are not yet completed. The baking and milling tests were very kindly made by Dr. F. J. Birchard, of the Dominion Grain Research Laboratory, Winnipeg.

On the results of two years' tests we have attempted to calculate the cost of threshing with the Combine in comparison with the cost of doing the same by binding, stooking and threshing in the usual way. The cost with the Combine, when it can be used with as good effect as it has been in these two seasons, is at least ten cents per bushel less than with the binder. The following statement shows the method of arriving at the cost of threshing with the Combine:—

Initial cost	$2,000
*Depreciation	10%
Interest	8%
*Repairs per year	$150

Average area harvested 25 acres per day (20 bushels per acre.)
Machine in use, 15 days per year.

Costs of operation per acre

Interest, depreciation and repair per acre	$1 15
One man and eight horses, 0·4 hours at $1.10	0 44
Operator, 0·4 hours at $1	0 40
Man and two horses hauling grain, 0·4 hours at 50 cents	0 20
Gasolene, one gallon per acre at 35 cents	0 35
Grease and oil	0 05
Total cost per acre	$2 59

Cost per bushel, 13 cents.

*Note.—Owing to lack of definite information depreciation is assumed to be 10 per cent and repairs $150 per year.

CORN LISTERS

The lister is essentially a double mouldboard plough with a corn planting attachment which places the seed at any desired depth in the bottom of the furrow opened by the plough.

Tractor-drawn two-furrow lister on test.

Two listers were used in our tests: A single furrow, "International," and a double furrow, "Oliver." Both of these companies make both double and single listers. No difference could be observed in the quality of work done by the double and single lister excepting that it was somewhat easier to make straight rows with the two-furrow machine. The two-furrow was, of course, cheaper to operate insofar as labour was concerned. With these two points in mind the following remarks may be applied to either machine:—

The increasing interest in corn growing in southwestern Saskatchewan has led some people to advocate strongly the use of the lister for planting the corn crop. Since listers and listing have been heretofore almost unknown in this province, it is necessary that our test shall deal chiefly with the general practice of listing and only secondarily with the mechanics of the lister.

Our work with the listers has satisfied us that from a mechanical point of view they are just as satisfactory as any standard farm implement. There is no doubt that the lister will perform satisfactorily and cheaply the work it is intended to do. We used the lister to plant both corn and sunflowers on summer-fallow, on stubble land which had been disked, and on stubble land which had received no other treatment. In no case did it fail to open the furrows and plant the corn at the proper rate and depth. After the corn was planted it was possible to harrow the land, and intertill the crop with a satisfactory effect on the weeds. There was no significant difference in yield between fields of corn which were planted with the lister and the seed drill.

In the section of this report dealing with the cost of production of crops will be found statements of the comparative cost of growing corn when planted with the seed drill and the lister. An advantage in favour of the lister of almost two dollars per acre is shown.

Several objections have been raised against the use of the lister. The first of these is that the farmer can plant corn satisfactorily with the seed drill so the investment in a lister is unnecessary. The second is that there is danger of the corn seed failing to grow because it is claimed that the soil in the bottom of the lister furrow is much colder than it is just beneath the surface. This objection is hypothetical. We have no evidence on the point in this district excepting the observation of the fact that in 1923 the corn grew as well when planted with the lister as when planted with the drill. Another season might be different; observations must be made for some years before this objection can be established or disproved. It may be necessary to purchase special cultivators for listed corn. Our experience indicates that this is not the case. It is slightly more trouble to make the first cultivation of listed corn, but this is not a serious matter.

If we were to base a judgment of the lister on one year's experience, we would say that, in most cases, there is no necessity for the farmer to purchase a lister, because corn can be grown just as well without it. On the other hand, the purchase of a lister may be advantageous to the farmer who intends to grow thirty or more acres of corn, because it will certainly save time at a season when time is very valuable.

STIFF-SHANKED CULTIVATOR

This implement was supplied by the Canadian Oliver Chilled Plow Works, Regina. The teeth are the same as those used on the ordinary "duck foot" cultivator, but the shanks are bolted rigidly to the frame so that they have no individual movement either laterally or vertically. The cultivator is for use with a tractor only. It was tested in the spring on corn and sunflower stubble, and later on the summer-fallow. In nearly all cases its action was as effective as that of the ordinary spring trip cultivator. Where there was much stubble or trash on the land, the stiff-shanked cultivator would not clear itself as well as the other cultivator. Another difficulty was that the rigid construction of the cultivator prevented the teeth from following slight undulations in the land. At times they would be out of the ground and again they would be in to an unnecessary depth. It was also found to be necessary to have a "break pin" in the hitch because of the possibility of striking stones or other obstructions which would likely break the teeth or bend the shanks if there were no means of releasing the tractor from the cultivator.

THE ROTARY HARROW

This harrow consists of two wheel-shaped sections, containing ordinary harrow teeth, mounted on a triangular frame. The sections are so mounted on the frame that when the harrow is in motion the teeth near the centre pene-

trate more deeply into the soil than those at the sides. This increased penetration of the inner teeth increases the resistance of these teeth and causes the sections to revolve toward the centre. The revolving motion, it is claimed, will enable the harrow more thoroughly to till the soil and will also cause the harrow to clear itself of stubble and other trash which it may tend to accumulate.

A rotary harrow tested at Swift Current.

Our trials of the harrow indicate that both of these claims are to some extent justified. Whether the increased stirring of the soil will produce increased yields is an entirely different question. Contrary to common belief on the point, many experiments, both here and elsewhere, indicate that increased yields do not necessarily follow increased cultivation; in fact, the reverse is often true.

One objection to the rotary harrow is that its draft per foot of width is considerably heavier than that of the common drag harrow. Moreover it is, as now sold, only a two-horse implement which makes work done with it more costly in labour than it should be. On the whole we can see no marked advantage in the use of the rotary harrow and there are the disadvantages which have been mentioned.

THE CARTER MAYHEW DISC GRAIN CLEANER

This machine was purchased in the spring of 1923 at a cost of $150. Our tests with it have not been sufficiently extensive to warrant very many definite statements concerning it. The following observations may be of interest to farmers:—

1. The cleaner will separate grain mixtures which any other machine we have seen fails to do; such, for example, as the separation of Kubanka and Marquis wheat. In one test the percentage of Marquis in Kubanka was reduced from 16 to 2 per cent. It should be noted, however, that many of the smaller seeds of Kubanka went out with the Marquis.

2. Separations of oats and wheat, barley and wheat, etc., are made very completely.

3. The operation of the machine is simple as there are almost no adjustments or changes for the operator to make.

4. The small machine which we are using is too slow to be of use for cleaning commercial grain, and the cost of a machine large enough to be useful for this purpose prohibits its use by farmers.

5. The small cleaner is very useful for cleaning seed grain, but even there it should be used in conjunction with a fanning mill.

6. The price of the small cleaner is probably more than most farmers would care to pay for a seed cleaner. It seems likely that the Carter cleaner will be most used by elevators and mills.

HORTICULTURE

VEGETABLE GARDENING

In the spring of 1923 an area of approximately four acres was set aside for experiments in vegetable gardening. The area was first divided into three blocks each of which was surrounded by a row of carragana seedlings. The blocks were then subdivided into ranges and rows so as to facilitate planting, working, and recording of data.

Rows are 30 inches apart and 30 feet long. All vegetables for experimental work are planted in duplicate rows. The planting is done each year on fallow land which has been prepared in the previous year. Since the amount of land required for a garden is small, expense is saved by always planting on fallow.

Among the many experiments the only ones from which reliable results can be given are the potato experiments. Most of the beet and carrot experiments were rendered unreliable by the failure of a large percentage of the seed to germinate. This failure was probably due to the extreme dryness of the spring. On July 21 a hailstorm almost completely destroyed the other garden crops.

The yields of the potato varieties are given below in pounds per acre:—

Country Gentleman	21,170
Ex. Early Eureka	19,450
Irish Cobbler	19,470
Green Mountain	22,340
Wee McGregor	20,010
King Edward	15,360
Duchess of Norfolk	21,210
Burnaby Mammoth	20,700
Duke of York	14,360
Carter Favorite	21,170
Epicure	19,850
Houghton Rose	19,720
Gold Coin	19,560
American Wonder	23,200
Early Hebron	22,330
Ash Leaf Kidney	21,460

DATES OF PLANTING POTATOES

Variety	Date	Yield per acre
		lbs.
Gold Coin	May 14	21,600
"	" 26	19,550
"	June 6	14,210
Early Ohio	May 14	12,320
"	" 26	9,860
"	June 6	10,150

TREE PLANTING

The only other Horticultural work consisted of tree planting. Three thousand caragana seedlings and four thousand Russian Poplar cuttings were set out for wind-break purposes. Owing to the extremely dry spring, many of the cuttings failed to take root, but those which did so made a vigorous growth as soon as the June rains came.

In addition to wind-break plantings, a considerable number of each of eighteen varieties of flowering shrubs were planted on the grounds for decoration purposes. Blue grass lawns were seeded around two of the houses.

CEREALS

Detailed results from the different variety tests are presented in the tables which follow. Farmers who are interested in the standing of the varieties in the tests should not draw definite conclusions from these tables as to the relative merits of the varieties under test. Tests of one or two year's duration cannot be relied upon. At the time of the hail storm many barley varieties were approaching maturity. These suffered so much damage that further records of the experiment were useless.

SPRING WHEAT

Twelve varieties of spring wheat were tested in triplicate plots on fallow. The hail storm of July 21 laid all varieties flat on the ground but all made a fair recovery as indicated by the yields. Prior to the hail the following observations were made as to strength of straw: Kubanka No. 37 and Kitchener were 60 per cent lodged. Kubanka Sask. No. 6 was 5 per cent lodged, and Kota was 80 per cent lodged. All other varieties were erect until hailed. No further observations could be made on the strength of straw. While some varieties seemed to suffer more hail damage than others this was probably due to the stage of maturity rather than any merits or defects in the varieties. The varieties which were most advanced toward maturity were most damaged.

Yields shown in the following table are averages of the triplicate plots. All varieties were sown May 2.

WHEAT—TEST OF VARIETIES OR STRAINS

Variety	Date of ripening	Number of days maturing	Yield of straw per acre	Yield of grain per acre	Weight per measured bushel after cleaning	Rust damage
			lbs.	bush. lbs.	lbs.	
Marquis Ottawa 15	Aug. 22	112	4,180	27 30	61·0	Considerable
Kubanka Ottawa 37	" 22	112	4,491	26 —	60·2	None
Red Bobs Supreme	" 20	110	3,877	26 —	60·0	Considerable
Ruby Ottawa 623	" 12	102	3,492	25 42	63·0	Little
Kota	" 15	105	4,590	25 24	63·0	None
Kubanka Sask. 6	" 22	112	5,010	23 12	60·2	None
Kitchener	" 25	115	4,865	22 36	60·0	Considerable
Pioneer	" 14	104	3,415	22 18	64·0	Little
Early Red Fife Ottawa 17	" 15	105	4,816	22 18	61·2	Considerable
Emmer	" 13	103	5,981	21 42	53·0	None
Red Bobs Early Triumph	" 20	110	3,442	21 18	60·0	Considerable
Red Fife	" 29	119	4,759	19 6	59·0	Bad

OATS

Oat varieties were so seriously damaged by hail that no determination of length of straw, strength of straw, or days required to mature, could be made. After the hailstorm a second growth occurred so that at the time of cutting some oats of each variety were shelling and some were green. All varieties were sown May 8.

OATS—TEST OF VARIETIES OR STRAINS

Variety	Yield of grain per acre	Weight per measured bushel after cleaning	Remarks
	bush. lbs.	lbs.	
Gerlach	68 17	32·8	15% lodged July 15
Leader	63 31	36·0	7% lodged July 15
Banner	60 10	38·6	5% lodged July 15
O.A.C. No. 72	58 10	34·2	
O.A.C. No. 3	55 24	36·0	
Victory	55 —	30·2	
Gold Rain	53 17	41·2	
Daubeney Ottawa 47	50 14	37·0	
Alaska	47 14	38·5	
Abundance	44 10	36·2	
Liberty Ottawa 480	42 17	51·0	

FLAX

The flax varieties all yielded very well. The amount of damage done by the hail storm was very small. All seeded May 9.

FLAX—TEST OF VARIETIES OR STRAINS

Variety	Date of ripening	Number of days maturing	Average length of straw	Yield of grain per acre	Weight per measured bushel after cleaning
			inch	bush. lbs.	lbs.
Common	Aug. 29	112	30	19 17	55·0
Novelty Ottawa 53	" 31	114	26	16 28	54·0
Premost	" 27	110	28	16 28	55·0
Crown	" 27	110	26	14 49	55·0

FALL RYE

The fall of 1922 was very dry and therefore retarded the growth of fall rye. Inspection of the plots the following spring revealed severe winter killing of Rosen and Von Runker varieties. Dakold exhibited a healthy, promising growth. Towards the middle of July there appeared a strong second growth in nearly all varieties. By July 20 when the heads of the first crop were ripe, those of the second were in blossom. This may be attributed to uneven germination, due to dry conditions of the previous fall. All varieties were sown on August 21, 1922.

FALL RYE—TEST OF VARIETIES

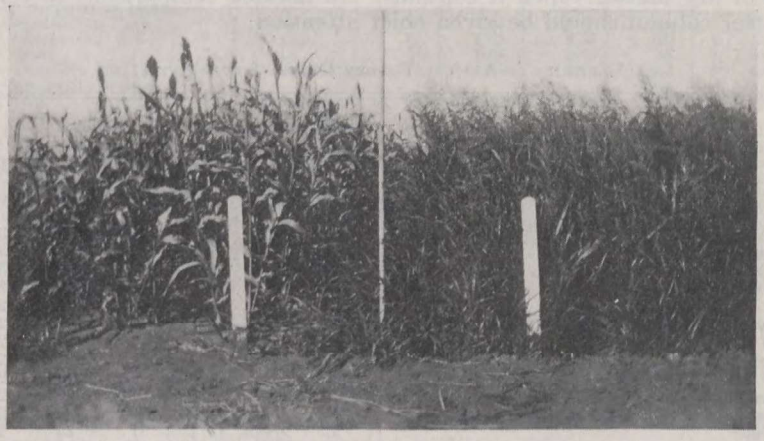
Variety	Date of ripening	Number of days maturing	% winter killed	Yield of straw per acre	Yield of grain per acre
			%	lbs.	bush. lbs.
Dakold	July 25	337	—	2,228	18 28
O.S.A.	" 25	337	10	2,272	12 39
Mammoth White (Brandon)	" 25	337	—	1,772	12 39
Ushland Pel 12-19	" 25	337	50	1,885	11 49
Rimpen	" 25	337	50	1,507	8 —
Rosen	" 25	337	80	1,591	6 6
Von Runker C1-133	" 25	337	85	1,157	2 22

FIELD PEAS

Six varieties of field peas were tested in the regular plots. The yields of straw and grain are recorded in the following table. All varieties were sown May 9 and harvested September 3.

FIELD PEAS—TEST OF VARIETIES

Variety	Length of straw	Yield of straw per acre	Yield of peas per acre
	inch	lbs.	bush. lbs.
Mackay Ottawa 25	56	3,189	32 55
Carleton	52	2,838	28 24
Chancellor Ottawa 27	54	2,923	19 12
Early White	50	3,050	18 30
Canadian Field	50	2,398	17 —
Golden Vine	52	2,590	13 —



Annual forage crops. Early Amber sugar cane (left), Sudan grass (right).

FORAGE CROPS

Particular attention is directed in this section to those tables headed "Dry matter." The yields of dry matter were calculated from the green weights after moisture determinations had been made upon representative samples of the products of all plots. At the time of harvesting, the total green weight of the crop

was taken. Immediately upon cutting, a representative two-pound sample of the crop was weighed out and cut up. This sample was allowed to become air dry. It was then subjected to a temperature of from 100 degrees to 105 degrees C., in an oven, from five to ten hours. At the end of the oven-drying period the sample was again weighed and the residue regarded as dry matter.

Kaffir corn growing at Swift Current.

An examination of the tables will reveal the fact that some varieties which stand high in yield of green material occupy a lower position in the list of dry matter yields. The value of a forage crop is determined by the amount and quality of dry matter which it contains. In making comparisons therefore, the dry matter column should be given chief attention.

VARIETIES OF ANNUAL FODDER CROPS—SOWN MAY 21

Crop	Height at harvest	Date of harvest	Green weight per acre		Dry matter per acre	
	inch		tons	lbs.	tons	lbs.
Siberian Millet	33	Aug. 31	9	306	3	1,533
Banner Oats	48	" 13	13	453	3	760
Japanese Millet	53	" 31	15	1,200	3	586
Peas and Oats	48	" 31	12	1,480	2	1,893
Common Millet	42	" 31	10	162	2	1,862
Spring Rye	47	July 19	6	128	2	1,546
Golden Millet	38	Aug. 31	12	52	2	1,506
Early Fortune Millet	33	" 31	7	810	2	1,120
Hubam	45	" 31	8	920	2	1,066
Hungarian Millet	35	" 31	7	1,520	2	960
Hog Millet	45	" 31	8	1,920	2	640
Sudan Grass	57	Sept. 12	7	26	2	506
Kaffir Corn	42	" 12	8	1,186	1	1,906
Early Amber Sugarcane	66	" 12	8	53	1	1,266

ANNUAL FODDER CROPS

The annual fodder crops, yields of which are shown in the accompanying table, were grown on fallow. Subsequently these crops will be grown on spring-ploughed stubble land as well. Yields shown are averages of triplicate plots.

In addition to the plots, Hungarian millet was grown on corn land and on stubble land, producing yields of from 2.5 to 3.5 tons of hay per acre. The following table shows the seed produced by three varieties of millet in 1923. All of our experience with millet indicates that it may have a place as a valuable fodder crop for this part of Saskatchewan. More extensive experiments with millets will be carried on in 1924.

VARIETIES OF MILLET SOWN FOR SEED

Variety	Size of plot in acres	Cultural treatment	Yield per plot	Yield per acre
			lbs.	lbs.
Hungarian	0·6	Stubble, spring-burned, double disked and harrowed.	1,012	1,686
Hog	0·51	Stubble, spring-burned, disked and harrowed	736	1,443
Common	0·76	Stubble, disked and harrowed	920	1,210

VARIETY TEST OF CORN FOR FODDER

Planted May 24. Harvested September 19

Variety	Date of emergence	Maturity at harvest	Height at harvest	Average number of ears per main stock	Average number of suckers per plant	Stand at harvest, per cent	Green weight per acre		Dry matter per acre	
			inch.			p.c.	tons	lbs.	tons	lbs.
Gehu—Commercial	June 6	Late glazing	50	1·50	2·6	98	9		2	208
N.D. White Flint, northern grown—McKenzie's	" 4	Late dough.	51	1·01	4·75	100	8	480	2	80
Leaming—Jno. Parks	" 6	Early milk.	84	1·00	0·8	88	13	400	1	1,840
Improved Squaw	" 4	Glazing	51	1·50	3·5	.....	6		1	1,250
N.W. Dent No. 15-772—McKenzie	" 5	Glazing	58	1·02	0·35	95	6	620	1	1,072
Twitchell	" 6	Glazing	66	1·20	2·6	90	8	1,770	1	920
Golden Glow—Duke	" 6	Milk	72	1·02	0·4	85	7	240	1	656
Compton's—early	" 6	Milk	74	1·30	2·3	96	9	400	1	576
N.W. Dent, commercial, seed grown at Brandon Exp. Farm	" 5	Glazing	64	1·01	0·8	94	6	720	1	544
N.W. Dent, commercial, C.E.F.	" 7	Dough	69	1·02	0·35	89	6	320	1	544
Longfellow—Duke	" 6	Milk	84	1·05	2·4	98	9	1,800	1	540
Longfellow—Disco No. 1099	" 6	Milk	76	1·50	2·1	100	8	192	1	528
Quebec 28—Macdonald College, Que	" 7	Late glazing	50	1·75	1·1	98	5	990	1	496
Quebec 28—Seed grown at Brandon Exp. Farm	" 4	Late dough.	54	1·03	3·0	97	5	1,472	1	464
White Dent Disco No. 90	" 7	Milk	72	1·03	0·20	91	9	240	1	400
White-cap Yellow Dent—C.E.F.	" 7	Early milk.	78	1·49	0·20	94	6	1,760	1	366
Leaming—Duke	" 7	Early milk.	76	1·05	0·1	86	6	992	1	192
Wisconsin No. 7—Parks	" 6	Early milk.	78	1·10	0·1	93	7	1,620	1	144
N. Dak.—Steel Briggs	" 5	Dough	70	1·80	1·6	89	7	1,450	1	64
Minnesota. No. 13	" 5	Early milk.	74	1·03	0·2	91	7	240	1	40
Disco Yellow Dent or Yellow Pride	" 5	Early glazing.	62	1·01	1·1	91	5	1,200		1,808
Manitoba Hard Flint	" 5	Ripe	42	1·03	3·0	75	2	800		1,750

Twenty-two varieties of corn were sown in rows representing $\frac{1}{160}$ acre. Each variety was replicated four times. Owing to early damage by rabbits and later damage by hail, a column has been provided in the table showing the percentage stand of each variety just before harvesting.

All the varieties were sown in rows 42 inches apart and 10 inches apart in the row.

Gehu, which stands highest in the list in yield of dry matter per acre, has also been tested in larger areas for seed production, yielding 35 bushels per acre of shelled corn.

N. D. White Flint from northern grown seed was almost as good as Gehu, both for fodder and seed production.

SUNFLOWERS

Eight varieties of sunflowers were planted on 1/160 acre plots and replicated four times. Each variety was sown on rows 42 inches apart and 10 inches apart in the row, and given just sufficient cultivation to control weeds. It will be noticed that the two multibranching varieties, Manchurian and Mixed Mammoth, stand first and third respectively in yield of dry matter per acre. These varieties were much shorter and did not appear to be so heavy a crop as Giant Russian.

VARIETY TEST OF SUNFLOWERS
Planted May 24, 1923 Harvested September 19

Variety	Date of emergence	Date of blossom	Type of growth	Maturity at harvest	Height at harvest	Per cent stand at harvest	Yield per Acre			
							Green		Dry matter	
					inch	%	tons	lbs.	tons	lbs
Manchurian—McKenzies	June 6	Aug. 10	Multi-branching	Late blossom.	72	85	17	400	3	850
Mammoth Russian—McDonald	" 6	Sept. 7	Stem.....	Full blossom..	98	95	18	1,800	2	210
Mixed Menonite—Rosthern	" 6	Aug. 3	Multi-branching	Seed ripe.....	60	80	10	1,100	1	1,630
Black—C.P.R.....	" 6	" 9	Single stem...	50% seed ripe.	60	82	8	1,300	1	1,420
Giant Russian—C.P.R.	" 6	" 20	Single stem...	Blossom.....	80	80	7	300	1	160
Mantica—C.P.R..	" 7	" 3	Single stem...	50% seed ripe.	70	86	7	1,100	0	1,890
Mixed—C.P.R....	" 7	" 9	Single stem...	Seed ripe.....	55	72	7	710	0	1,840
Russian Giant—Disco	" 6	Sept. 7	Single stem...	Blossom.....	98	94	7	80	0	1,470

GRASSES, CLOVERS, AND MIXTURES

Despite the fact that the rainfall of 1922 was sufficient to produce an abundant grain crop, grasses seeded with wheat made a very poor stand. In 1923 there was again an abundant rainfall, but the thin stand of grasses and clovers made poor hay crops. Due to the thin stand, all grasses were weedy.

VARIETIES OF CLOVERS, GRASSES AND MIXTURES
(Sown with a nurse crop of wheat)

Plot No.	Variety	Rate seeded	Yield per acre (2 cuttings)			
			Green		Dry	
		lbs.	tons	lbs.	tons	lbs.
1	Brome and western rye	6 and 6	2	1,080	1	732
2	Brome	12	2	520	0	1,988
3	Western rye	12	3	640	1	1,892
4	Timothy	5	0	1,640	.....	
5	Brome and western rye	6 and 6	1	880	1	1,140
6	Kentucky Blue	6	0	1,800	.....	
7	Western rye and sweet clover	6 and 6	2	1,280	0	1,808
8	Brome and sweet clover	7 and 4	3	1,520	1	644
9	Brome and western rye	6 and 6	3	240	1	1,760
10	Western rye and alfalfa	10 and 3	3	320	1	208
11	Grimm alfalfa	10	3	640	.....	
12	Variegated alfalfa	10	1	1,680	0	1,420
13	Brome and western rye	6 and 6	2	608	0	1,728
14	Red clover	7	0	640	.....	
15	Yellow sweet clover	10	3	1,080	1	232
16	White sweet clover	10	3	1,840	.....	
17	Brome and western rye	6 and 6	2	880	1	280

Timothy and Red Clover were total failures. Grasses which had been seeded in 1922 without a nurse crop produced from two to three times as much hay in 1923 as those seeded with wheat. All grass plots which had been seeded with a nurse crop were very weedy. All plots were cut twice; the first cutting was early in July and the second between September 1 and 15. Yields shown in the table are totals of the 2 cuttings.

MANGELS AND TURNIPS

Mangel varieties were planted with a hand seeder, in duplicate rows, on summer-fallowed land. The early spring drought and lack of vitality of the seed resulted in uneven stands of some varieties. Plants were thinned to a distance of ten inches apart in the row. Rows were 42 inchs apart.

VARIETIES OF FIELD TURNIPS

Planted May 12. Thinned 10 inches apart June 16. Harvested October 10

Varieties	Green weight of tops per acre		Green weight of roots per acre		Dry weight of roots per acre		Remarks
	tons	lb.	tons	lb.	tons	lb.	
Hall's Westbury—Ewings	5	200	16		1	800	Round, purple top, fairly uniform
Monarch Swede—Nappan	4	1,920	14	1,040	1	780	Round, fairly uniform and smooth.
Laing's Purple Top—Ewings	5	80	13	640	1	656	Round, purple top, fairly uniform, smooth.
Bangholm, No. 7022—Trifolium Co., Denmark.	6	160	14	1,920	1	614	Round, purple top, uniform, smooth.
Selected Westbury—Steele Briggs	6	160	16	640	1	537	Round, purple top, fairly uniform, smooth.
Shepherd Swede No. 2056—Trifolium Co., Denmark.	5	400	16		1	488	Slightly oval, bronze top, fairly uniform, smooth.
Bangholm—McKenzie's	6		14	1,920	1	350	Round, purple top, not very uniform, smooth.
Canadian Gem—Steele Briggs	5	1,200	11	1,600	1	312	Oval, red top, uniform, smooth.
McKenzie's Monarch or Elephant	5	1,520	11	240	..	1,955	Oval, dark purple top, fairly uniform, smooth.
White Swede—McKenzie's	6	960	11	560	..	1,888	Round, bronze top, fairly uniform, prongy.
McKenzie's Superlative	6	800	13	560	..	1,859	Oval, purple top, uniform, fairly smooth.
Monarch—Nappan	5	1,840	14	960	..	1,778	Oval, purple top, fairly uniform, smooth.
Selected Bangholm—Charlottetown.	6	800	12	1,440	..	1,728	Round, bronze, many small roots, smooth.
Kulrabetro—No. 7021	5	240	13	1,040	..	1,728	Oval, a few small roots, fairly smooth.
Hanzard, Improved—Steele Briggs.	5	240	10	320	..	1,640	Oval, green to bronze top, a few small roots, fairly smooth.
McKenzie's Kangaroo	4	1,440	8	960	..	1,640	Round, purple top, few small roots, fairly smooth.
Invicta Bronze Top—Ewings	4	1,280	12	1,760	..	1,498	Round, bronze, many small roots, fairly smooth.
Select Purple Top—Steele Briggs	9	560	13	800	..	1,057	Round, mixed bronze and purple tops, fairly uniform, fairly smooth.
Halewoods Bronze Top—Steele Briggs.	4	1,760	6	800	..	992	Oval, bronze, nearly all small roots, smooth.

Turnip varieties were seeded and treated in the same manner as the mangel varieties. Germination of the turnip seed was much better than the mangel seed.

TEST OF VARIETIES AND STRAINS OF MANGELS

Planted May 12. Thinned July 5. Harvested October 9

Variety	Date of emergence	Number in row at harvest	Per cent small roots	Per cent prongy roots	Per cent dominant type	Weight of tops per acre		Weight of roots per acre		Dry weight of roots per acre		Remarks
						tons	lb.	tons	lb.	tons	lb.	
Yellow Intermediate C.E.F....	June 4	55	10·0	6	91 p.c. Intermediate.	7	1,500	17	1,840	1	1,328	Orange, smooth, very easy pullers.
Prize Mammoth Long Red—Steele Briggs.	" 4	65	9·00	10	92 p.c. Long.....	15	720	20	1,200	1	1,280	Red, hard pullers.
Graham Bros. Giant Sugar Rose	" 4	65	15·0	0	92 p.c. Long.....	5	1,700	16	320	1	1,102	Rose, smooth, easy pullers.
Wm. Ewing's Select Giant Rose	" 4	60	6·0	8	80 p.c. Long.....	6	700	16	160	1	1,020	Rose, smooth, easy pullers.
Barres Stryno No. 3084.....	" 4	55	7·0	2	98 p.c. Intermediate.	5	560	15	480	1	936	Orange, smooth, very easy pullers.
Giant Yellow Globe—Steele Briggs.	" 4	63	14·0	0	99 p.c. Globe...	5	250	17	1,120	1	595	Yellow, smooth, easy pullers.
Graham's Danish Sludstrup.....	" 4	45	17·0	11	90 p.c. Intermediate.	6	490	11	1,120	1	286	Mixed colors, easy pullers.
Yellow Leviathan—Steele Briggs	" 4	61	11·0	8	90 p.c. Intermediate.	7	250	15	1,360	1	240	Orange, not uniform, easy pullers.
Golden Tankard—Halifax Seed Co.	" 4	58	13·0	0	97 p.c. Half Long	4	1,260	12	720	1	160	Deep orange, smooth, easy pullers.
Giant White Feeding—Steele Briggs.	" 4	40	12·5	7	70 p.c. Intermediate.	4	320	11	560	0	1,960	White, easy pullers.
Red Tankard—McDonald.....	" 4	51	10·0	2	95 p.c. Half Long	4	160	14	480	0	1,918	Red, smooth, very easy pullers.
Half Sugar Rose No. 114—Trifolium Co., Denmark.	" 4	54	16·0	4	81 p.c. Intermediate.	6	1,100	11	800	0	1,600	Rose, easy pullers.

CARROTS

Carrot varieties were sown with a hand seeder, in single rows 42 inches apart. On July 5 all varieties were thinned to a distance of approximately 3 inches apart. Owing to the dry spring, germination of the seed was poor, and even after the plants were up many of them were cut off by wind-borne soil particles. McKenzie's Improved, half long white, had the highest yield with 1,648 pounds dry matter. Second highest yield came from Danish Champion, from the Central Experimental Farm, 1,040 pounds dry matter.

BUILDINGS AND IMPROVEMENTS

The building programme for the year included the erection of two cottages, an implement shed, a cattle stable, two portable granaries, a larger straw shelter with board corrals for steer feeding. Other works which may be included with the buildings are the trench silo and a drilled well.

COTTAGES

The cottages are single-story, six-room structures 24 feet by 36 feet on the ground. Both have full basements. They are equipped with hot-air furnaces and modern plumbing fixtures. Sewage disposal is effected by means of a septic tank and an underground disposal field.

IMPLEMENT SHED

The implement shed, which is 30 feet by 124 feet, is really a combination of several buildings under one roof. The possession by the Station of a combined reaper-thresher as well as a 26-46 grain separator made it necessary to provide special storage space for these implements. The new shed provides space for the threshing machinery as well as for all other implements used on the farm. In one end of the building there are rooms partitioned off for the following purposes: workshop, 15 feet by 32 feet; plot seed room, 14 feet by 32 feet; ice house, 10 feet by 12 feet; dairy room, 12 feet by 18 feet; and on one end of the shed there is constructed a lean-to pump house 14 feet by 14 feet. Above the implement section, work shop, and plot seed room there is storage space of 30 feet by 90 feet which will be used for storing light implements, drying and storing fodder samples and drying seed corn.

CATTLE STABLE

The stable is 30 feet by 56 feet. At one end is a feed room 10 feet by 30 feet with the silo adjoining it. The stable floor, mangers, gutters, etc., are of concrete. There is stall accommodation for eighteen mature cattle in one row running the length of the stable. At the other side are four box stalls, each 9 feet by 13 feet.

PORTABLE GRANARIES

Each of the portable granaries is 12 feet by 14 feet by 8 feet with a capacity of 1,000 bushels. They are built according to plans published by the British Columbia Department of Lands and Forests.

STRAW SHELTER

The straw shelter is an extension of the one constructed last year. The dimensions of the new shelter are 16 feet by 60 feet. The thickness of straw on the roof has been increased from four feet to about ten feet. This will probably make it unnecessary to replace the straw yearly as would be the case when only a thin layer is used on the roof. The shelter is divided into two pens, each one opening into a corral 26 feet by 60 feet. The outside fence of the corral

is made of inch boards which rise to a height of eight feet. Dividing the two corrals is a feed passage six feet in width, on either side of which is a flat-bottomed feed trough running the full length of the corral. Each corral will accommodate from twenty to twenty-five head of two-year-old steers.

TRENCH SILO

The trench silo is so located that ensilage may be taken from it with a horse and stone boat and fed conveniently to the steers in the corrals. The silo is eighty feet long, nine feet deep and fourteen feet wide. The whole excavation was made with teams and scrapers; the only hand work required was the time of two men for half a day to smooth down the sides. The side walls are practically perpendicular; both ends were sloped so as to allow teams to go in and out while digging the hole. When the trench was nearly finished one end was dug down almost straight and the other left sloping so as to make an easy exit for removing the ensilage with a horse. The accompanying pictures give a good idea of the method used in digging the silo. By using a fourteen-foot chain and turning the plough on its side it was possible to keep the walls perpendicular with very little hand digging. The total cost of the excavation and roof was $98, made up as follows:—

160 hours manual labour at 30 cents	$ 48 00
240 hours horse labour at 10 cents	24 00
Wire and straw roof	26 00
Total cost	$ 98 00

Excavating trench silo with wheel scraper.

This silo has a capacity of about 150 tons. An upright silo of the same capacity would cost from five to seven times as much. It would also cost more to fill and empty the upright silo, but the latter type would of course be more durable, unless the walls of the trench were cemented.

WELL-DRILLING OPERATIONS

In June, 1923, a well-drilling rig was engaged to drill a deep well with a view to getting a permanently satisfactory supply of water. A four-inch hole

was sunk to a depth of 330 feet, at which point it appeared from the nature of the stratum water would be found. A three-inch casing was put down and a pump installed. It was found impossible, however, to pump any water. The drilling was continued to a depth of 460 feet. At this depth a stratum of sand was encountered, which, upon test with a pump, yielded a supply of water. However, as pumping continued, the volume of sand in the water increased until finally, after using every possible effort to separate the sand and water without success, the hole was abandoned. It was then decided to sink a new hole in the hope of getting water where the bottom would contain more gravel and coarse sand. The second hole was drilled to a depth of 340 feet. At this depth a layer of gravel was reached. After considerable difficulty experienced in removing a percentage of clay and fine sand, this well is now producing a satisfactory supply of good, clean water.

EXPERIMENTAL PROJECTS UNDER WAY AT THE EXPERIMENTAL STATION, SWIFT CURRENT, SASK.

ANIMAL HUSBANDRY

Project No.

A. 185. Feeding choice vs. inferior steers.
A. 254. Establishing herds of dual purpose cattle.
A. 331. Cost of maintaining work horses.
A. 404. Winter shelters for steer feeding.

FIELD HUSBANDRY

ROTATION EXPERIMENTS

F. 101. Wheat continuously.
F. 105. Two-year rotation—Summer-fallow; wheat.
F. 106. Two-year rotation—Summer-fallow; fall rye.
F. 129. Seven-year rotation—Corn; wheat; hay; pasture and summer-fallow; wheat summer-fallow; fall rye.
F. 142. Sequence of crops.

CULTURAL EXPERIMENTS

F. 144. Summer-fallow treatment.
F. 145. Summer-fallow substitutes.
F. 146. Stubble treatment.
F. 149. Soil packers.
F. 151. Preparation of land for corn.
F. 153. Place in rotation to seed fall rye.
F. 154. Place in rotation to seed grasses and clover.
F. 156. Dates of seeding corn and sunflowers.
F. 157. Date of seeding fall rye.
F. 163. Rate of seeding fall rye.
F. 167. Methods of seeding corn.
F. 168. Method of seeding sunflowers.

FARM MANAGEMENT EXPERIMENTS

F. 195. Cost of producing farm crops.
F. 196. Cost of operating tractor.
F. 198. Stubble burner machines.

SOIL MOISTURE EXPERIMENTS

F. 200. Influence of various cultural treatments upon soil moisture as determined by moisture determinations.
F. 201. Utilization of soil moisture by crop rotations grown in tanks.
F. 202. Relative transpiration of crops grown in tanks.
F. 203. Utilization of soil moisture by corn, sunflowers and potatoes grown in large tanks.
F. 204. Drought resistance of crops grown in tanks.
F. 205. Comparison between the growth of individual wheat plants in tanks and in the field.
F. 206. Weeds and their effect on wheat in tank experiments.
F. 207. Influence of rate of seeding wheat when grown in tanks.
F. 208. Effect of mixed and undisturbed soil on crops grown in tanks.
F. 209. Variation among individual plants of wheat, corn and sunflowers.
F. 210. Effectiveness of soil mulches as measured by losses of water from soil in tanks.
F. 211. Cultural experiments on soil in tanks.
F. 212. Variations in moisture content of soil samples within the field plot.

CEREALS

Ce. 1. Common spring wheat: Test of varieties or strains.
Ce. 3. Durum wheat: Test of varieties or strains.
Ce. 4. Winter wheat: Test of varieties or strains.
Ce. 5. Oats: Test of varieties or strains.
Ce. 6. Barley: Test of varieties or strains.
Ce. 7. Peas: Test of varieties or strains.
Ce. 9. Flax: Test of varieties or strains.
Ce. 11. Winter wheat: Test of varieties or strains.
Ce. 50. Multiplication of cereals.

FORAGE PLANTS

Ag. 1. Indian corn: Variety tests for ensilage purposes.
Ag. 2. Indian corn: Variety tests for the production of grain.
Ag. 4. Indian corn: Rows vs. hills.
Ag. 5. Indian corn: Rates of seeding.
Ag. 16. Mangels: Variety tests for yield and purity.
Ag. 36. Carrots: Variety tests for yield and purity.
Ag. 46. Turnips: Variety tests for yield and purity.
Ag. 51. Swedes: Variety tests for yield and purity.
Ag. 66. Sugar beets: Variety tests for yield and purity.
Ag. 76. Sunflowers: Variety tests for yield and purity.
Ag. 126. Alfalfa: Variety tests hardiness, yield, suitability.
Ag. 127. Alfalfa: Inoculation.
Ag. 133. Alfalfa: Seeding with vs. without a nurse crop for seed production.
Ag. 161. Sweet clover: Variety tests.
Ag. 162. Sweet clover: Methods of seeding for hay production.
Ag. 166. Sweet clover: Seeding with vs. without a nurse crop for seed production.
Ag. 201. Timothy: Variety tests for yield and purity.
Ag. 212. Brome grass: Rates of seeding for hay production.
Ag. 221. Western rye: Variety tests for yield and purity.
Ag. 222. Western rye: Methods of seeding for hay production.
Ag. 241. Annual hay crops: Variety test for yield and suitability.
Ag. 241. (A) Grain varieties: Variety test for yield and suitability.
Ag. 241. (B) Legume varieties: Variety tests for yield and suitability.
Ag. 241. (D) Mixtures: Variety tests for yield and suitability.
Ag. 251. Millets: Variety tests.
Ag. 255. Miscellaneous grasses: Variety tests.
Ag. 256. Miscellaneous legumes: Variety tests.
Ag. 258. (B) Hay and pasture mixtures experiment: Alfalfa as a base.
Ag. 258. (C) Hay and pasture mixtures experiment: Sweet clover as a base.
Ag. 258. (F) Hay and pasture mixtures experiment: Mixed grasses.