DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

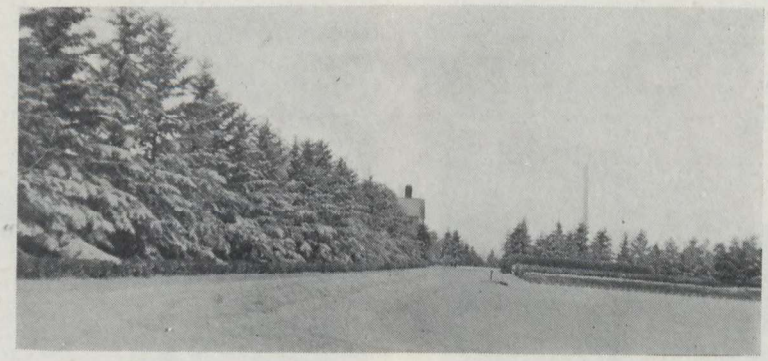
EXPERIMENTAL STATION

Rosthern, Sask.

RESULTS OF EXPERIMENTS

1932-1936 INCLUSIVE

F. V. HUTTON, B.S.A.
Superintendent



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CONTENTS

Experimental Station, Rosthern, Sask.

RESULTS OF EXPERIMENTS, 1932-1936

INTRODUCTION

The results of experimental work and recommendations derived therefrom as enumerated in this report are based on the past five years, which years have included some of the driest and most irregular on record at this station for more than twenty years. During this period, soil drifting, drought, rust, and grasshoppers did considerable damage in this district, and while this station in particular did not suffer from all these agencies, the abnormal conditions which created them were present.

HORTICULTURE

Tree Fruits

The past five years have served well in testing the hardiness and suitability of the many varieties of tree fruits grown here. Extreme dry seasons followed immediately by severe winters have automatically graded the hundreds of named and numbered varieties under test. It has also been found that fruit trees where moisture is limited must be well spaced and kept clear of weeds

Fig. 2.—Well shaped apple tree. Short trunk guards against sunscald and low habit of growth allows for easy picking and less damage from wind.

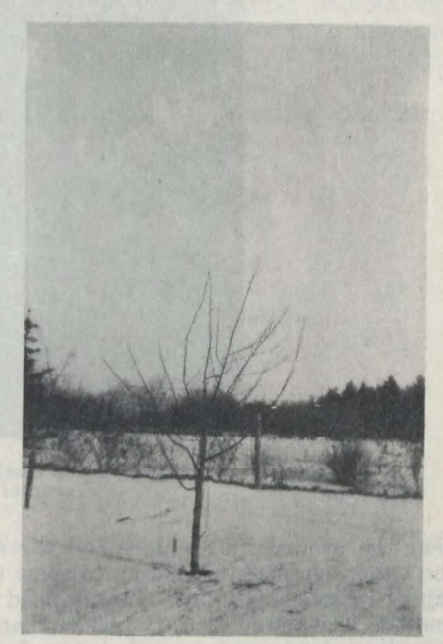

Fig. 3.—A poor type of fruit tree. Very likely to sunscald.

and other growth. Where close planting has been practised, the fruit has been small and shrunken and many trees have died from drought. For a permanent orchard, fifteen feet by fifteen feet is a good spacing, though sandcherries and sandcherry hybrids may be planted closer. Protection from winter winds is also very necessary, particularly on the north and west. This protection should be provided by a caragana hedge and a good windbreak of elm, ash, maple, spruce, or pine. Natural bluff is excellent for this purpose. The caragana hedge should run all the way around the orchard, but fruit trees should not be planted closer to it than twenty-five feet. Fruit trees should not be pruned to a long bare trunk but should be encouraged to throw out branches

FIG. 4.—Tree of Rosthern Seedling No. 2 and closeup of one branch.

near the ground, particularly on the south side. These branches will protect the trunk against sunscalding to some extent, which often is the cause of severe injury in some varieties. Low topped trees will also be injured less by winds, and the fruit is more easily picked than from high topped ones. When branches are allowed to grow near the ground, care must be taken not to leave growth which comes from below the graft union, which is usually about the ground level.

Many fruit trees are damaged eaeh year by rabbits, and possibly the eheapest and eertainly the most effieient method of proteetion against this pest is by feneing with ehieken wire. Where rabbits are plentiful, fruit trees should never be planted unless some protection is given, as they are very fond of fruit tree bark.

Miee also cause injury oecasionally, but if all weeds and grass are kept down around the trees and rubbish which will supply shelter is eleared up, they will cause little damage most years.

APPLES.—The apples which have been tested at this station have for convenience been grouped under four main heads: Class I, those which are 100 per cent hardy; Class II, those whieh are 60 per eent to 100 per eent hardy; Class III, those which are below 60 per eent hardy but which bear a few fruits; and Class IV, those whieh were too tender to survive and bear fruit.

CLASS I. The apples in this list are praetically 100 per cent hardy, and will produce profitable erops of fruit of good size and quality. Some are superior to others in size and quality, and the list as follows is made out in order of desirability:—

Osman
Rosthern Seedlings No. 2, 3, or 8
Mecca
Rosthern Seedling No. 1 (Calros)
Jewel
Red Siberian
Garnet
Columbia
Norman
Olga
Gertrude
Bedford
Robin

CLASS II. These ean be reeommended for favourable locations, but should never be expected to weather the average Saskatehewan winter without very good protection. They are placed in order of preferenee eonsidering hardiness, size, and quality of fruit.

Silvia
Rosthern Seedling No. 20 (Jacques)
Rosthern Seedling No. 30
Florenee
Alberta
Amur
Dolgo
Alexis
Magnus
Heyer No. 12
Sue
Tony
Rosthern Seedling No. 5
Rosthern Seedling No. 6
Jewel x Rideau
Rosthern Seedling No. 7
Rosthern Seedling No. 22
Rosthern Seedling No. 21
Prince
Pioneer
Charles
Rosilda
Piotosh
Transcendent
Printosh
Jewel x Tetofsky
Fisher Seedling
Hopa
Heyer No. 8
Rosthern Seedling No. 16
Rosthern Seedling No. 17
Rosthern Seedling No. 18
Rosthern Seedling No. 19

Apples selected from seedlings at this station and named and deseribed for the first time are:—

Calros (Rosthern Seedling No. 1) (Blushed Calville seedling). Hardy, strong grower, good bearer, upright habit of growth with fruit clustering towards ends of branehes and top of tree. Fruit is roundish eonieal, 1½ inehes in diameter, calyx protruding and persistent; eolour yellow nearly covered with crimson; flesh yellow, mellow when ripe, and fair to eat. Ripe early September and will keep until November. Good canning quality.

Anaros (Rosthern Seedling No. 2) (Antonovka seedling). Hardy, strong grower, good bearer; branches long and take horizontal form, giving tree spreading habit. Fruit round and somewhat flattened, 1½ inches in diameter, calyx persistent, colour yellow nearly covered with crimson; flesh yellow, mellow when ripe and pleasant to eat though acid. Ripe early September and will keep only a few days in storage. Very good for canning and excellent for jelly.

Jacques (Rosthern Seedling No. 20) (Blushed Calville seedling). Kills slightly in severe winters, vigorous upright grower and good fruiter. Fruit roundish conical, 1⅝ inches in diameter, calyx persistent, colour yellow with crimson blush, flesh yellow and only fair to eat. Ripe early September and will keep in storage until November. Fair canning quality.

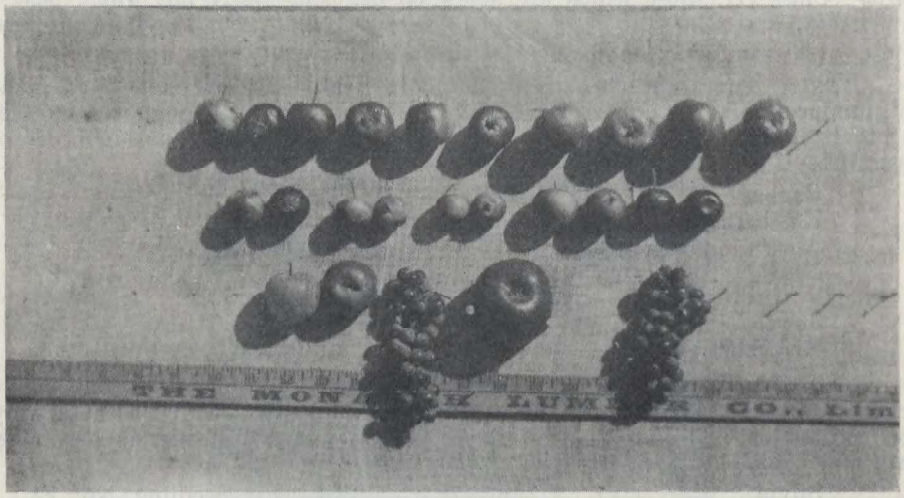

FIG. 5.—Showing the fruit of some hardy apples as well as some of the more tender varieties and Beta grapes. Reading from left to right, two fruits of each variety: Top row: Rosthern Seedlings Nos. 1, 2, 5, 20, and 22; second row: Osman, Charles, Pioneer, Columbia, Prince; bottom row: Jewel x Rideau, Beta grape, M.5033E80, and Beta grape again. (Taken Sept., 1936)

Class III. The trees in this group will produce in some seasons a few fruits close to the ground where the buds have been well protected by snow, but they are not reliable and cannot be recommended for this district. This class includes mostly large apples, though there are a few crabs which are either tender or of very poor quality.

Blushed Calville
Pine Grove Red
Rosthern Seedling No. 15
M. 5019D3
M. 5033E80
Angus
Anoka
A.E.-1-2-25-I.H.
Dean x McIntosh
Elkhorn
Heyer No. 2
Heyer No. 6
I.H. No. 6
Jewel x October
Lyman crab
Mabel crab
M.A.C.D.20a
M. 5034E251
M. 5023B1
M. 5021C37
Pioneer x Ontario
Red Sweet crab
Rosthern Seedling No. 4
Sapina
Wabaskaw
Wapella
XXX-1-U. of S.
Green Sweet
Gretna
Simbirsk

Class IV. This group includes all those which have been tested here and have not fruited during the past five years. All kill to the snowline each winter or have killed completely. They cannot be recommended.

Antonovka
Red Anis
Charlamoff
Duchess
Dawn
Carleton
Hibernal
Ostrakoff
Elsa
Lora
Perkin
Repka Kislaga
Patricia
Lobeth
Nile
Spyland
Greves
Cora
Drumbo
Rocket
McEarly
Oswald
Milwaukee
Rupert
Melba
Haralson
Hibkie
Carmel Sweet
Adno
Tasty
Beda
Anisim
Forerunner
Holz
Yellow Sweet crab
Somnitelnoe
Early Minnesota
Sapina
Anisette
Romankoff
Pyrus Ussuriensis
Nipissing
Slocan
Cowichan
Meach

Over one hundred varieties under number, mostly from Morden, have also been tested.

PLUMS, CHERRIES, AND PLUM X CHERRY HYBRIDS.—As with apples, stone fruit varieties tested at this station can be separated into four main classes: Class I, those which are 100 per cent hardy; Class II, those which are 60 per cent to 100 per cent hardy; Class III, those which are below 60 per cent hardy but which bear a few fruits; and Class IV, those which were too tender to survive and bear fruit.

Class I. The plums in this list have proved practically 100 per cent hardy, and produce good crops of good sized and fair quality fruits which will ripen before frozen.

Tree forms

Assiniboine
Mammoth
Cree
Wilson River
Stevenson
Valley River
Wastesa
Yuteca
Brackett

Bush forms

Champa
Sioux
Tom Thumb

FIG. 6.—Champa Cherry.

FIG. 7.—Assiniboine plum when dormant, showing upright habit of growth.

FIG. 8.—Assiniboine plum in fruit.

Class II. The varieties included in this list are those which are between 60 per cent and 100 per cent hardy, are reasonably productive and of good size and quality. These trees can be recommended for favourable locations, but should not be expected to survive and be productive under severe conditions and with ordinary protection.

Tree forms	*Bush forms*
Pembina	Sapa
Omaha	Etopa
Ojibwa	Opata
Tokata	Oka
Underwood	Huya
Waneta	Zumbra
Winona	
Compass Cherry	
Mansan	

Class III. This class comprises those varieties which are less than 60 per cent hardy but which have produced some fruits during the past five years. The fruit is usually of good size and quality but cannot be recommended for this district because of the small yield.

Tecumseh	Ezapatan
Hennepin	Newport
Elliot	Oziya
Hanska	Skuya
Cheresota	Wachampa
Sansota	Wahanka
Enopa	

Class IV. This class consists of varieties which are very tender or which ripen too late to escape early fall frosts in this district.

Dara	Red Wing
Emerald	Kahinta
Minn. 105	Toka
S. D. 27	Minn. 83
Mound	Minn. 108
Minn. 155	Stanapa
Minn. 119	La Crescent
Kaga	Mankato
Golden Rod	Topa
Minn. 35	

GRAPES.—Beta and two other varieties whose identity has been lost have been under test at this station for several years. Beta is superior to the others in every respect. When laid down and covered with soil before the ground freezes, Beta winters through and fruits each year. If not covered, it will kill to the ground and will not fruit the following year.

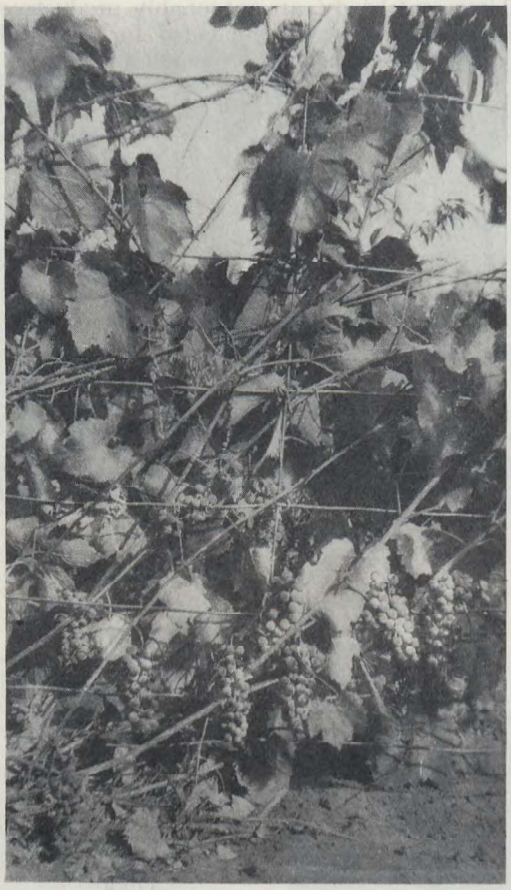

FIG. 9.—Beta grapes.

SMALL FRUITS

RASPBERRIES.—The following varieties of raspberries have been under test during the past five years: Brighton, Count, Herbert, Sunbeam, Latham, Ohta, Newman, Miller and Viking.

To ensure an even crop to the tips of the canes each year when sufficient moisture is present, planting by the hill method, pruning to four or five canes at each hill in the fall, and bending down and covering with soil, are recommended. If this system is followed, any of the varieties listed above will survive our winters, and those which are best in size and quality of fruit are recommended: Herbert, Viking, or Newman. The Viking is nearly spinefree and is a very strong grower, but Herbert is possibly the best in quality. If the canes cannot be protected in the above manner, the hardier varieties, such as Sunbeam and Ohta, should be grown, as they will survive most winters with very little killing. The fruit of the last two is smaller than the others and is usually considered of inferior quality.

GOOSEBERRIES.—An extensive test of gooseberry varieties is under way, but so far the information on new and promising varieties is very limited. From information gathered from other sources coupled with our own, we have no hesitation in recommending the following as hardy, productive, and of good quality: Pixwell, Abundance, and Perry. Many of the older and better known varieties are not hardy here, killing severely in most winters.

CURRANTS.—This class of fruit usually thrives well here and winter kills very little. They should be watched closely in the spring and early summer for the appearance of currant worms, which can be effectively controlled by an arsenate spray or dust if applied in time. More detail regarding sprays for this and other purposes can be procured on request.

The following varieties of the different types of currants are recommended:—

Red—Diploma, Red Cross, Prince Albert;
White—White Imperial, White Grape;
Black—Kerry, Climax, Magnus, Crandall.

FIG. 10.—Protection of raspberries by a modified method where only the tips are covered. Where snowfall is even, this method is perfectly satisfactory.

STRAWBERRIES.—The following method of growth is considered most desirable: Plant in rows four feet apart with the plants set 18 inches apart in the rows. Planting should be done as early as possible in the spring, and all flowers should be picked off June bearing sorts for that season. Runners should be trained to form rows about one foot wide, and, where moisture is limited, the increase should be restricted to two runners per plant.

Many varieties have been tested during the past five years, but only two June bearing and two fall bearing types are recommended: June bearing, Senator Dunlap, and Dakota; fall bearing, Gem, and Mastodon.

CO-OPERATIVE FRUIT TESTING

Previous to 1931, plum, apple, raspberry, and strawberry varieties were sent out to various farmers throughout the district for trial. Most of these trials have paid good dividends in information on comparative hardiness of varieties under different conditions and on different soils. When they were visited this year after

being grown for several years and reaching fruiting age, a reliable gauge of hardiness could be made, which is the basis of the recommendation in fruits indicated above. New varieties will be tried out in a similar manner before being offered to nurseries for public sale.

FIG. 11.—The home of one of the Rosthern Experimental Station's fruit co-operators.

FIG. 12.—Method of growing fruit seedlings to fruiting age. Rows 15 feet apart and trees 2 feet apart in rows.

VEGETABLES

Most of the common, and a few valuable but not commonly grown, vegetables are listed in the following recommendations. The recommended varieties in each class are given in order of desirability.

ARTICHOKE.—Jerusalem.

ASPARAGUS.—Mary Washington.

BUSH BEANS.—Green podded: Stringless Green Pod, Bountiful; Wax podded: Round Pod Kidney Wax, Davis Stringless White Wax.

BROAD BEANS.—Superior Long Pod, Seville.

BEETS.—Detroit Dark Red, Good for All.

BROCCOLI.—Early Sprouting type, Green Sprouting.

This vegetable is of little value under real dry conditions, being much poorer than cauliflower under such conditions.

CABBAGE.—Early, Golden Acre; mid-season, Copenhagen Market; late, Danish Ballhead.

CARROTS.—Nantes, Chantenay, Tendersweet.

CAULIFLOWER.—Early Snowball, Danagloria.

CELERY.—Golden Plume, Golden Self Blanching.

Excellent celery has been produced by a thick planting in a cold frame in June after other material was removed. By this method the plants could be watered conveniently, and, when danger of early fall frosts arrived, the glass was put on for protection. The celery can be left outside by this method until early November.

CITRON.—Colorado, Red Seeded.

CORN.—Early, Banting; mid-season, Golden Gem, Dorinny, Goldban; late, Golden Bantam, Golden Sunshine.

The corn varieties listed are all yellow and of good quality, and, although Pickaninny is ready for use as early as Golden Gem, it is not recommended on account of its dark colour.

CUCUMBERS.—Early pickling, Early Russian, Chicago pickling; Salads or slicing, Long Green.

EGG PLANT.—Blackie, Black Beauty.

KOHL RABI.—White Vienna.

The flavour of kohl rabi is similar to swede turnip but the quality is inferior unless growth is rapid as promoted by abundant moisture.

LEEKS.—Giant Corentan, Webb Champion.

LETTUCE.—Leaf: Grand Rapids, Black Seeded Simpson; Head: New York, Big Boston.

MUSKMELON.—Golden Champlain, Page Early, Heart of Gold, Scott Select.

WATERMELON.—Will Sugar.

Melons and cucumbers are planted outside about the middle of May. In order to protect them from winds and to concentrate heat, they are planted between rows of corn which are spaced six or eight feet apart.

ONIONS.—Yellow Globe Danvers, Early Grano, Large Red Wethersfield, Early White Barletta.

PARSNIPS.—Guernsey, Short Round.

PARSLEY.—Champion or Triple Moss Curled.

PEAS.—Thos. Laxton, Lincoln, Horsford Market Garden.

PEPPERS.—Harris' Earliest.

PUMPKIN.—Small Sugar.

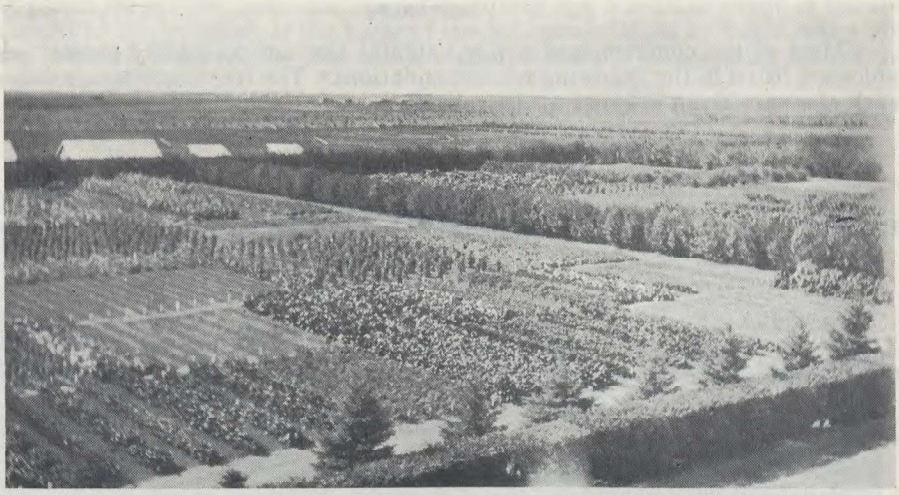

FIG. 13.—A section of the vegetable garden at the Rosthern Experimental Station.

SALSIFY.—Sandwich Island.

RADISH.—Saxa, Scarlet Olive, White Icicle.

SPINACH.—Early: King of Denmark; Late: New Zealand.

SWISS CHARD.—Fordhook Giant.

SQUASH.—Buttercup, Hubbard.

TOMATO.—Herald, Earliana, Best of All, Break O'Day.

Tomatoes are sown in heat early in April, pricked out into flats or small pots later and planted out in the open about June 10. Pruning to one stem and allowing three sprays of fruit to form has been found most desirable in respect to quality and quantity of ripe fruit. Little advantage has been observed in tying the plants to stakes over allowing them to lie on the ground.

FIG. 14.—Method of staking and pruning tomatoes employed at the Rosthern Experimental Station.

POTATOES.—Pink: Early Ohio; White: Irish Cobbler; Warba; Netted: Netted Gem.

Of the above, Warba is the earliest maturing and Netted Gem the latest, though all will mature well enough for good storage. Netted Gem is most resistant to common scab. All cook up white and dry.

FIG. 15.—Harvesting Early Ohio potatoes with a potato digger on the Rosthern Experimental Station.

TREES AND SHRUBS

TREES

Hardy evergreens thrive at this station, and free use has been made of them in landscaping the grounds. White spruce (*Picea glauca*), Norway spruce (*Picea abies*), Colorado spruce (*Picea pungens*), Jack pine (*Pinus banksiana*), Lodgepile pine (*Pinus contorta latifolia*), Scotch pine (*Pinus sylvestris*), Swiss stone pine (*Pinus Cembra*), Balsam fir (*Abies balsamea*), American arborvitæ (*Thuja occidentalis*), and Prostrate juniper (*Juniperus communis var. canadensis*) are all quite hardy, several being native to the locality. During the winter of 1935-36, which was one of the most severe ever recorded at this station, Lodgepole pine, Scotch pine, American arborvitæ, and Colorado spruce sunscalded somewhat, but few trees received permanent injury. The other evergreens listed exhibited no winter injury whatever. *Pinus mugo mughus*, a dwarf form of pine, has been grown here for many years but kills back severely most winters. It is in a southern exposure at this station, which is detrimental to good wintering.

Deciduous trees which have proven hardy in winter and resistant to drought for many years are: American elm (*Ulmus americana*), Green ash (*Fraximus lanceolata*), Manitoba maple (*Acer Negundo*), White willow (*Salix alba*), Amur maple (*Acer ginnala*), Tartarian maple (*Acer tataricum*), and American larch or tamarack (*Larix laricinia*). Canoe birch (*Betula papyrifera*) is winter hardy but does not stand dry conditions well. Russian poplar (*Populus petrowskyana*) is also perfectly hardy and will stand drought well while small, but is short lived and cankers quickly where moisture is limited. As this tree grows quickly and is very aggressive, it is difficult to establish slow growing and more permanent trees close by. Mossycup oak (*Quercus macrocarpa*) is perfectly hardy but a slow grower.

FIG. 16.—Typical Lodge-pole pine about 20 years planted.

FIG. 17.—American arborvitæ or White Cedar.

FIG. 18.—Typical White Spruce.

FIG. 19.—Colorado Blue Spruce about 10 years old.

SHRUBS

The most useful of the shrubs tested, when beauty and hardiness are both considered, are the caraganas, lilacs, and honeysuckles. Three species of caragana have done well: *Caragana arborescens* for shelter as a hedge either trimmed or allowed to grow naturally and as a specimen shrub; *Caragana frutescens* in clumps, and *Caragana pygmaea* for a low hedge or for planting around the base of a house where a low shrub is wanted. *Caragana frutescens* throws up many suckers and may be too aggressive if planted with weaker growing shrubs. The other two mentioned do not sucker. Of the lilacs under trial, varieties of the common lilac, *Syringa vulgaris*, give the most and finest bloom. *Syringa villosa* and *Syringa josikaea* are hardy and extend the blooming period by two weeks.

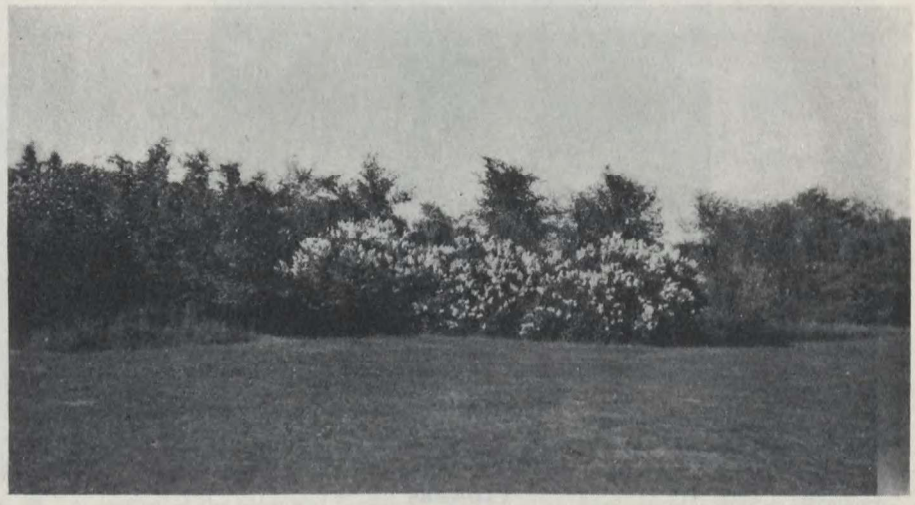

FIG. 20.—Common lilacs in bloom.

They are coarser and taller growing than the common lilac and have smaller flower spikes. *Syringa japonica*, the Japanese tree lilac, blooms in July after most shrubs have finished, and is unsurpassed in fragrance by any of the other lilacs. Tartarian honeysuckle (*Lonicera tatarica*) thrives and is attractive in bloom and in fruit. *Lonicera alberti*, a procumbent species, attracts attention because of its unique habit of growth. Where crowded, it is likely to kill at the tips in dry seasons. Other shrubs worthy of mention, placed in order of height are: Mountain ash (*Sorbus americana*), Siberian crab (*Malus baccata*), Saskatoon berry (*Amelanchier alnifolia*), Canadian plum (*Prunus nigra*), Buffaloberry (*Shepherdia argentea*), High-bush cranberry (*Viburnum trilobum*), Hawthorn (*Crataegus rotundifolia*), European Red Elder (*Sambucus racemosa*), Golden current (*Ribes aureum*), Ural false-spiraea (*Sorbaria sorbifolia*), Double flowering plum (*Prunus triloba*), Garland spiraea (*Spiraea arguta*), Oriental spiraea (*Spiraea media*), Billiard spiraea (*Spiraea Billiardii*), Black berried cotoneaster (*Cotoneaster acutifolia*), Sandcherry (*Prunus pumila*), Russian almond (*Prunus nana*), Rose daphne (*Daphne Cneorum*). All of the above plants are hardy, many are native, and all will give a good show of bloom, foliage, or fruit.

Hardy roses under test which are worthy of mention are: *Rosa rugosa,* Betty Bland (Skinner), Banshee, Scotch Yellow, Redleaf rose (*Rosa rubrifolia*), and Pink Grootendorst. The above roses have come through many winters without protection other than that given by nature and they bloom freely each season.

FIG. 21.—Mountain ash.

FLOWERS

PERENNIALS

Following is a list of perennials selected from those tested here and found satisfactory:

Achillea ptarmica fl. pl. vars. "The Pearl" and "Perry's White," *A. millefolium rubra* (Yarrow); *Anthemis tinctoria, var. Kelwayi* (Yellow Camomile); *Aquilegia caerulea* (Colorado Columbine), *A. canadensis* (American Columbine), A. Long-spurred Hybrids; *Campanula carpatica* (Carpathian Bellflower); *Chrysanthemum coccineum* (Perennial Daisy); *Delphinium grandiflorum,* and *D. hybridum* (Perennial Larkspurs); *Dianthus plumarius, D. deltoides superbus, D. speciosus, D. chinensis macrosepalous* (Perennial Pinks); *Dicentra spectabilis* (Bleeding Heart); *Gaillardia aristata* (Blanket Flower); *Gypsophila paniculata fl. pl.* (Perennial Baby's Breath); *Hemerocallis dumortieri* (Early Daylily); *Hesperis matronalis* (Sweet Rocket); *Iris germanica,* and *I. sibirica; Lavatera Thuringiaca,* Siberian variety; *Lilium tigrinum* (Tiger Lily), *L. tenuifolium* (Coral Lily); *L. Dahuricum, L. concolor, var.* Dropmore; *Linum sibiricum* (Blue Flax); *Lychnis Arkwrightii, L. chalcedonica* (Scarlet Lychnis); *Papaver nudicaule* (Iceland Poppy), *P. orientale* (Oriental Poppy); *Phlox paniculata* and the varieties Baron von Dedem, General von Heutz and Jean Bart, *P. suffruticosa var. Miss Lingard; Rudbeckia laciniata fl. pl.* (Golden Glow); *Veronica spicata* (Speedwell); Viola, bedding varieties and *V. cornuta.*

PEONIES

Peonies are rated as the finest of the herbaceous perennials grown here. The season of bloom is from the last week of June to July 20. The following varieties have been grown for twelve years or more and are listed as the best of the collection:—

White—Duchesse de Nemours and Marie Lemoine.

White, edged or flecked with crimson or carmine and flesh white—Couronne d'Or, Festiva Maxima, Madame de Verneville.

Pale pink and pale pink fading to white or edged with white—Asa Gray, Marguerite Gerard.

Pink—Edulis Superba, Livingston, Madame Auguste Dessert, Monsieur Jules Elie.

Red—Felix Crousse.

FIG. 22.—A portion of the perennial border at the Dominion Experimental Station, Rosthern.

BULBS

TULIPS AS BEDDING PLANTS

Early Single tulips have been found the most satisfactory for planting in the garden. They have bloomed year after year without protection of any kind. Their season is from May 20 till the middle of June. Bloom is rather scarce in the garden at this season and the bright, glowing colours of the early tulips have added a distinctive touch to the station grounds.

If fresh bulbs are purchased each year the cost is rather high; but this is unnecessary, as many varieties have thrived for years even when the beds were planted to annual flowers after the tulip bloom was over. Varieties recommended for bedding are: Cramoisie Brilliant, brilliant red; Couleur de Cardinal, scarlet, purple shaded; Crimson King, bright crimson; Maes, bright scarlet; Joost van Vondel, red and white; Fred Moore, apricot orange; La Reine, white; Mon Tresor, golden yellow; Pottebakker White; Yellow Prince; Le Matelas, bright pink; Pink Beauty.

Early Double, Darwin and Mayflowering tulips have been given a limited trial. They have all bloomed for a few seasons, but they have not proved so hardy or so prolific as the Early Single varieties. They bloom later than the latter and so extend the tulip season until the end of June. They are now being given a more thorough test with the beds mulched for winter protection.

Annual Flowers

Following is a list of annual flowers which may be sown in the open with good prospects of success. Little time has been devoted to the production of bedding plants in heat at this station.

Agrostemma coeli-rosa (Rose of Heaven); *Alyssum maritimum* (Sweet alyssum), vars. Little Gem and Snow Carpet; *Amaranthus tricolor splendens* (Joseph's Coat), *A. melancholicus ruber, A. caudatus* (Love-Lies-Bleeding); *Anchusa capensis* (Cape Forget-me-not); *Asperula azurea setosa; Bartonia aurea; Calendula officinalis* (Pot Marigold); *Campanula macrostyla* and *C. attica; Calandrina grandiflora; Centaurea suaveolens* (Yellow Sweet Sultan); *C. imperialis* (Sweet Sultan), and *C. cyanus minor* (Bachelor's Button); *Chrysanthemum coronarium* (Annual Chrysanthemum); *Clarkia elegans;* Cosmos, early flowering varieties; *Coreopsis drummondi,* var. Golden Wave, *C. atrosanguinea,* and *C. tinctoria; Cynoglossum amabile* (Chinese Forget-me-not); *Delphinium ajacis* (Annual Larkspur); *Dimorphotheca aurantiaca* (African Daisy); *Eschscholtzia californica* (California Poppy); *Gaillardia picta* and *G. picta lorenziana* (Blanket Flowers); *Godetia; Gypsophila elegans* (Annual Baby's Breath); *Helichrysum bracteatum* (Strawflower); *Layia elegans; Leptosyne Stillmani; Iberis coronaria* (Annual Candytuft); *Lavatera splendens rosea* (Annual Mallow); *Linum grandiflorum rubrum* (Scarlet Flax); *Lathyrus odoratus* (Sweet Pea); *Lupinus Hartwegii* (Annual Lupin); *Mathiola bicornis* (Night-scented Stock); *Nolana grandiflora;* Oxalis, var. Cloth of Gold; *Papaver rheas* and *P. somniferum* (Annual Poppies); *Schizanthus retusus* and *S. wisetonensis;* (Butterfly Flowers); *Statice spicata* and *S. suworowi* (Sea Lavender); *Tagetes pumila* (Tagetes); *T. patula* (French Marigolds), vars. Legion of Honour and Josephine. *Tropaeoleum major* (Tall Nasturtiums), *T. minus* (Dwarf Nasturtiums); *Viola cornuta* (Bedding Violas), *V. tricolor* (Pansy); *Malcomia maritima* (Virginia Stock); *Viscaria oculata.*

Sweet Peas. There are so many good varieties of sweet peas that space will not permit listing them all. The following varieties have been selected from a list of more than one hundred tested:

White—Constance Hinton, Edna May Improved, Giant White, Avalanche.

Cream—Matchless, Daffodil.

Picotee—Youth, Annie Ireland.

Light Pink—Bridesmaid, Venus, Elizabeth, Mary Pickford, Valentine, Elegance, Picture, Elfrida Pearson, Magnet.

Deep Pink—Miss California, Doris, Annie Bownass, Miss Philadelphia, Idyl, Ascot.

Rose Pink—Pinkie, Montrose, Hebe, Mrs. A. Searles, Hawlmark Pink.

Rose—Ruffled Rose, Sunset.

Cerise—Charming, Hero.

Scarlet—Hawlmark Scarlet, Huntsman, 2 L.O., Campfire, Pimpernel

Crimson—Charity, Sybil Henshaw.

Orange—Crusader, Gold Crest, Fordhook Orange.

Mauve—Chieftain, King Mauve, Mauve Beauty.

Lavender—Powerscourt, Colne Valley.

Blue—Sapphire, Blue Bird.

Purple—Olympia, Royal Purple, Floradale Purple.

Maroon—The Sultan, Warrior.

FIELD HUSBANDRY

During the five years 1932-36, the months of July and August have been characterized by hot dry weather with resultant losses in yields and grades of all crops. The quality of the crops during these disappointing years depended largely upon the stage of maturity reached before the adverse weather arrived. In 1932, grades were materially reduced while yields were, generally speaking, above average. In 1933, both yields and grades were materially reduced. Costs during this period have not changed to any great extent and prices in general have not been especially favourable. During this five year period, none of the rotations conducted here has shown a profit, and losses have ranged from three cents to $1.85 per acre, but certain crops within different rotations have shown profits each year despite the adverse conditions.

Moisture conditions have been the limiting factor during this period. The rainfall during the growing season has been below average, and no reserves have been carried over from one year to the next. The soil type at this station is a light loam; the subsoil is a clay loam, and below, about two feet from the surface, is sand. This type of soil induces rapid germination, quick growth, and early maturity, but requires considerable—and timely—rainfall to produce good crops. It is not adapted for building up moisture reserves, and seasonal rains are very important to the agricultural welfare based on this soil type.

The past five years, however, have been a very strict test on the value of rotations, and have shown definitely the weaknesses of certain rotations under such conditions. It should therefore be of interest to study the results of the various rotations conducted here during this period.

Cost of Producing Crops

In the following tables, representing the cost of producing the various crops within the rotations conducted here, average cost and return values are used for the five-year period. Cost and return values (cost of seed, labour, threshing, etc.) vary somewhat from year to year, and cannot be fixed. The following are the cost and return values used in 1936:—

Wheat	$ 0.83	bu.	Oat or barley straw	$ 1.00	ton
Oats	0.40	bu.	Corn silage	2.50	ton
Barley	0.42	bu.	Oat sheaves	8.00	ton
Western rye grass hay	7.00	ton	Sweet clover hay	8.00	ton

Cost Values

Rent	$ 2.00	acre	Manual labour	$ 0.20	hr.
Barnyard manure	0.50	ton	Tractor operator	0.20	hr.
Seed wheat	0.75	bu.	Use of tractor	0.90	hr.
Seed oats	0.50	bu.	Ensiling machinery rent	0.18	ton
Seed barley	0.60	bu.	Twine	0.11	lb.
Sweet clover seed	0.0365	lb.	Threshing wheat	0.07	bu.
Western rye grass seed	0.04	lb.	Threshing oats	0.06	bu.
Seed corn	0.08	lb.	Threshing barley	0.06	bu.
Machinery	1.35	acre	Ceresan	1.00	lb.
Horse labour (single horse)	0.06	hr.	Nitro Nox	0.30	bottle

The foregoing will illustrate the cost and return values used in the rotations. Similar figures are arrived at each season, and are based on the actual cost and return values for that year. In apportioning the costs to the various crops, the cost of summerfallowing is charged in the proportion of two-thirds to the first crop and one-third to the second crop after fallow. The charge of 50 cents per ton for manure covers only the cost of application, and when used on a rotation, the cost of application is charged equally to all the crops in the rotation excepting the summerfallow. Manual labour is charged at the prevailing rates in the district and includes board and lodging. Cost and return values for the grains, etc.

COST PER ACRE OF PRODUCING WHEAT, OATS, BARLEY, AND HOED CROP DURING THE FIVE-YEAR PERIOD 1932-36

Item	Wheat after fallow	Wheat after wheat	Wheat after sweet clover	Oats after wheat	Barley after hoed crop	Hoed crop
	$	$	$	$	$	$
Rent and taxes	2.12	2.12	2.12	2.12	2.12	2.12
Manure	.37	.46	—	.24	1.12	1.12
Seed	.89	.89	.93	.73	.69	1.45
Machinery	1.35	1.35	1.35	1.35	1.35	1.35
Twine	.26	.18	.21	.17	.35	.34
Manual labour	.60	1.00	1.09	1.08	.73	4.47
Horse and tractor labour	.41	.96	1·01	1·02	.54	3.19
Threshing and ensiling	1.55	1.12	1.16	1.27	2.37	1.09
Cost of summer-fallowing	3.70	1.85	—	—	.74	1.49
Seed treatment	.01	.01	.01	.01	.01	.01
Total cost per acre	11.26	9.94	7.88	7.99	10.02	16.63
	bu.	bu.	bu.	bu.	bu.	tons
Yield per acre	22·7	16·8	17·6	26·1	41·4	6·07
	$	$	$	$	$	$
Value per acre	11.61	8.56	8.94	7.08	12.99	12.54
Profit or loss per acre	.35	−1.38	1.06	− .91	2.97	−4.09
Cost per bushel or ton	.45	.59	.45	.31	.24	2.74

are based on the average market prices in the spring and fall as they apply. Threshing charges are at the prevailing rate in the district. The charge for use of machinery, use of tractor, and horse labour are set charges based on experimental data in cost of production studies pertaining to Western agriculture.

During the period 1932-36, wheat was produced at the same cost per bushel after summer-fallow and sweet clover. However, the profits per acre were 35 cents and $1.06 respectively in favour of the sweet clover rotation represented by the five-year rotation, F244, which is dealt with later.

Wheat grown on stubble showed a loss in all the rotations because of low yields and high costs.

Oats showed a loss when grown after wheat. Yields have been low and return values were low. The grade has also been below average. Barley after hoed crop has given a high profit per acre despite high costs. Yields are usually very high when the crop is grown after a hoed crop which has the effect of a partial fallow.

Corn showed a distinct loss despite a high yield of 11.36 tons in 1935. This crop is generally a losing proposition in this district because of lack of moisture and the short frost-free season. The corn very seldom reaches maturity. Where the crop is required for silage and can be used in a green state, it can be grown to advantage in the rotation, but as a cash crop it is unprofitable, although it is difficult to arrive at a fair valuation of this crop. Its food value in a green state is about one-third of the feeding value of well cured hay, and this is the basis used for its evaluation.

Summary of Rotation Results

During the five-year period under review, five rotations were conducted at this station. A five-year rotation of green oats, wheat, oats, barley (seeded down), and hay was also conducted during part of the period but was discarded in 1936 because of dry conditions, poor yields, and inroads by weeds which could not be checked with the sequence of crops in the rotation. The following

table is a summary of the profits and losses per acre incurred for the various rotations.

Designation	Rotation	Profit or Loss per acre	
		1932–36	10-year average
		$	$
C	Fallow, wheat, wheat	− .08	2.04
D	Fallow, wheat, wheat, oats	−1.04	2.57
			8-yr. avge.
F244	Fallow, wheat (seeded down), sweet clover hay, wheat, oats	− .03	.15
		1932–35	1926–35
5-year	Oats (green feed), wheat, oats, barley (seeded down), hay (This rotation showed a profit of $56.94 in 1927 and $28.62 in 1928 and has given exceptionally good yields.)	−1.85	4.17
		1932–36	10-yr. avge.
J	Fallow, wheat, wheat, oats (seeded down), hay, hay	− .78	.82
P	Fallow, wheat, wheat, oats for green feed, corn, barley (seeded down), hay, hay	− .36	− .27

These rotations have been conducted at this station for a considerable number of years. Some one of them should be suitable for most farming conditions in the West, and if not directly applicable, could be modified to comply with individual conditions.

Rotation J—six-year rotation—has shown a fair profit over a 24-year period. This rotation is adapted to mixed farming and has a good proportion of cash crops. Unless the area is suitable for growing hay, however, this rotation is not adapted, as two years of hay are included. If hay can be grown successfully, this rotation combats weeds very well; but if hay cannot be grown to good advantage, the hay land becomes a source of infestation.

Rotation C is a common rotation in the West and is profitable in many areas; but with the same crop being grown year after year, it is somewhat exhaustive of the same plant nutrients, and weeds are difficult to control.

Rotation D is a very common rotation in those sections where it is not practicable to raise stock. It is a straight grain rotation and is similar to Rotation C in that it has a tendency to encourage some annual weeds which a hay or pasture crop is effective in controlling.

Rotation P has also been tested for 24 years with a fair profit to its credit. This rotation is too long for most conditions, but is adapted to mixed farming conditions and could be used to advantage on small farms. It is a very well balanced rotation and is very clean compared with many rotations of shorter duration. Balance in a rotation is determined by the variety and sequence of the crops included. It will vary with the district represented; for example, a balanced rotation for a grain district might not be suited or be likely to be considered a balanced rotation for a live stock area. Rotation P shows balance between grain crops (or cash crops, as they are sometimes called) and forage or feed crops. Another factor in determining the balance of a rotation is the sequence of crops. It is important to arrange this sequence in such a manner that one crop will aid a succeeding crop or at least impair it as little as possible. Different crops use varying amounts of the different soil nutrients, and for this reason a variety of crops is desirable in most rotations. Other crops have the ability to restore certain elements to the soil. By choosing the crops carefully and by arranging them to the best advantage, it is possible to reap the greatest returns with the least loss of fertility,—a most important consideration. Rotation P, as a mixed farming rotation, has complied with these requirements at this station. Its adaptation is somewhat limited, but could be modified to meet conditions in the West to advantage.

Rotation F244 is a more recent rotation and shows promise as a well balanced rotation for mixed farming purposes. It is adapted to areas where sweet clover can be grown. In this rotation a new procedure is used, namely that of seeding the clover down with the first crop of wheat on summer-fallow. This has been found to be a profitable practice, with reasonable assurance of a good catch of clover the following year. When the clover is harvested, it is cut fairly high with a binder, and when the sheaves are removed, the residue is ploughed under. This gives a green manure and partial fallow effect, and the wheat crop the following year has yielded well and proved considerably more profitable than wheat grown on stubble.

The five-year rotation is adapted to mixed farming conditions as the percentage of cash crops is low in comparison to feed crops. It is a very exhaustive rotation from a moisture standpoint, and suffered severely during the period 1930-35, after which it was discarded. Owing to the dry conditions, hay catches were poor, and with no summer-fallow in the rotation, it was found impossible to compete with the weeds under our conditions.

Cultural Experiments

Because of forced reductions in appropriations, practically all cultural, forage, and cereal experiments were discontinued at this station in the fall of 1932. The practices and recommendations dealt with hereunder are based on results obtained prior and up to 1932.

About thirty cultural experiments were carried on at this station. The following are some of the findings from those which were in progress for a number of years and whose results are fairly reliable.

Manure for Hay.—An application of manure on hay land has shown a decided increase in the hay yield the year following, both for first and second year hay. Usually, however, the increased net returns did not cover the cost of application when $1 per ton is charged for applying the manure.

Manure for Wheat.—Twelve tons of fresh manure applied in winter on first year wheat stubble and ploughed in the spring has given the highest yield, with twelve tons of rotted manure applied in fall the next highest. If weed seeds are present in the feed which is fed, it is not advisable to use fresh manure.

Partial Green Manuring.—Clover hay removed and the sod ploughed has given, in the following crop, results about equal to those from bare fallow. The clover sod was treated as a partial fallow. Manured summer-fallow gave the greatest returns, but when the cost of manure is deducted, the net return is less than from the clover sod.

Dates of Planting Corn and Sunflowers for Ensilage.—Corn is best planted the third or fourth week after work begins on the land. In a normal season this would be about the 15th to 20th of May. With sunflowers, the earliest possible date of planting has given the best results.

Dates of Seeding Flax.—The third week after seeding begins has given the best results with flax. Flax is very susceptible to late spring frosts.

Dates of Seeding Wheat.—Best results have been obtained from seeding about a week after work on the land begins.

Dates of Seeding Barley.—Barley has yielded highest when sown about two weeks after work on the land begins.

Dates of Seeding Oats.—Oats have given best results when sown about a week after work begins, though the spread in yield between dates of seeding is not as great with oats as with wheat or barley.

DATES OF SEEDING FALL RYE.—September 1st to 15th is the best time to sow fall rye when it is not to be pastured. Good stands were obtained with later seedings, but the crop was correspondingly later in ripening.

RATES OF SEEDING FLAX.—One-half bushel, or 25 to 30 pounds, is the best rate to sow flax.

RATES OF SEEDING WHEAT.—One and one-half to one and three-quarters bushels has given the best results on this soil.

METHODS OF PLANTING SUNFLOWERS.—Sunflowers or corn in rows 30 inches apart and left as sown has given the best results at this station. In planting, the drill should be adjusted to drop the seed about three inches apart.

SUMMER-FALLOW SUBSTITUTES.—A five-year average of results places corn next to bare summer-fallow in point of yield. Sunflower land was next best, followed by oats in rows. Green feed oats sown June 15th was the poorest fallow substitute. For the five-year average 1926-30, wheat after corn produced 26·9 bushels per acre followed by 21·9 bushels after sunflowers, 21·5 bushels after oats in rows, and 17·6 bushels after oats for green feed.

FIG. 23.—Corn crop in 1936 showing damage due to depletion of moisture caused by roots from windbreak of poplars.

YIELDS OF GRAIN FOLLOWING CORN, SUNFLOWERS AND TURNIPS.—This experiment was carried on in conjunction with the hoed crops in three rotations in which the hoed crop fields were halved and one half sown to sunflowers and half to corn in one field, corn and turnips in another, and sunflowers and turnips in another. The following results were obtained:

A five-year average of wheat following corn has yielded 20·7 bushels per acre and after sunflowers, 15·4 bushels per acre.

A three-year average of barley following sunflowers has yielded 19·2 bushels per acre and after turnips 22·8 bushels per acre.

A two-year average of barley following corn has been 36·2 bushels per acre and after turnips 27·6 bushels per acre.

The foregoing results indicate conclusively that sunflowers make the greatest demand on moisture and soil elements, turnips next, and corn the least. The difference in yield is no doubt caused more by depletion of moisture than of food elements.

METHODS OF SOWING GRASSES AND CLOVERS FOR HAY AND SEED.—Western rye grass, brome grass, alfalfa, and sweet clover have been sown broadcast and in rows 6 inches, 24 inches, 30 inches, and 36 inches apart, with a nurse crop and alone, for hay and seed. The object in each sowing was to determine the most desirable and profitable way of growing each crop. The following results and conclusions have been derived from several years' trials.

With western rye and brome grass a higher yield was obtained where the grass was sown alone rather than with a nurse crop. The value of the nurse crop should be added to the nurse crop seeding, however, which would no doubt offset the lack of yield the first year. Where grass is sown alone, weeds are troublesome the first year and require to be mowed.

Sowing in six-inch drills gives a higher yield than sowing by any of the other methods. The average yield of hay decreases as the spacing between the rows is increased. For seed, the 24-inch spacing has given the highest yield, but 30-inch spaced rows are more often used because of convenience in cultivation.

The differences in yields when alfalfa was sown with a nurse crop and without were not significant. The difference in sowing in rows or broadcast was also very slight, though the yield was somewhat better when sown in medium wide rows.

With sweet clover, the yields were higher when sown alone. The quality of the hay for feed was poorer, being coarse and not so palatable—particularly if the crop was sown in wide spaced rows. If the sweet clover forage can be used for ensilage purposes, the coarseness is not so objectionable; but where it is to be used for hay, the finer stalks are desirable. Sowing sweet clover in rows for hay is not advisable for the above reason. Seed yields are higher if a nurse crop is used, and no marked increase in yield is indicated from sowing in rows rather than broadcast or in six-inch drills.

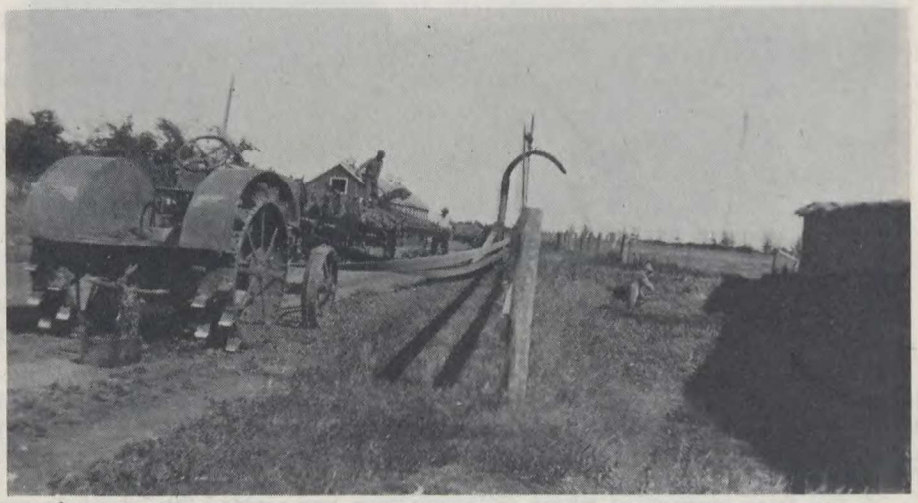

FIG. 24.—Filling a trench silo on the Rosthern Station. Weed seeds buried in the ensilage proved 100 per cent killed.

WEEDS.—In addition to the various rotations carried on and the observations made on their relative merits in the control of weeds, further experiments and tests have been made on the control of weed infestation.

In the fall of 1929, packages of wild oats and stinkweed seeds were enclosed in fine brass screen containers and buried in the ensilage at silo filling time. The packages were uncovered in March when the ensilage was being fed. On examin-

ation, the wild oats were found to be badly decomposed and showed no germination in soil. The stinkweed seeds appeared normal, except that the colour was nearly black instead of a brownish red; but none of the seeds germinated.

The same effect is obtained in manure piles which are built up each year and spread on the land the following season. One year, if the piles are properly built and tramped, ensures good decomposition and 100 per cent killing of weed seeds.

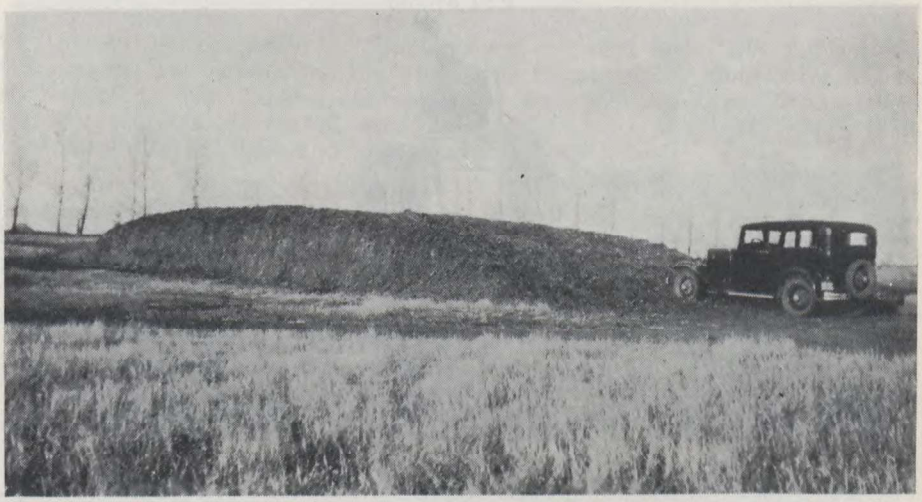

FIG. 25.—A properly built manure pile on the Rosthern Station in which weed seeds kill 100 per cent.

CONTROLLING WEEDS WITH SULPHURIC ACID.—In 1931, an experiment was laid down to determine the effectiveness of sulphuric acid at different concentrations and rates of application on controlling weeds, principally stinkweed. Test plots of small areas were conducted at this station and on private farms. Three concentrations, 3, 5, and 7 per cent by volume, and two rates, 50 gallons and 100 gallons per acre were used. Only one variable was allowed in each experiment. The following conclusions were derived:—

1. The proper time to use the acid spray is when the grain is in the three or four leaf stage and the weeds are correspondingly small. The extent of weed killing is decreased the further advanced the grain and the weeds are, and the damage to the grain increase directly with the stage of growth.

2. When the grain and weeds are small, almost a complete killing of stinkweed and smaller killing of other weeds may be obtained with very little crop damage.

3. When the grain is in the shot blade and the weeds are also large, the killing is proportionately smaller for the weeds and the damage to the grain will run up to 40 or 50 per cent of the leaf tips being killed.

4. Under advanced conditions of growth, the 7 per cent solution at 100 gallons per acre was the most effective. With proper stages of growth, the 5 per cent proved just as effective as the 7 per cent and with less crop damage.

5. In all tests the 100 gallons per acre was more effective than the 50 gallon application. Not only was this true for a given concentration, but 100 gallons of the lower concentrations were more effective than 50 gallons of any higher concentrations.

6. Crop damage by the higher concentrations was apparent after treating in the dead, spotted, and stripped leaf tips; and at harvest, in shorter straw and delayed maturity.

FIG. 26.—Sulphuric acid spraying machine in operation on the Rosthern Station.

FIG. 27.—Stubble in the fall after harvesting showing effects of sulphuric acid spray. Note weedy growth in stubble where spray was not used.

7. As the concentration of the acid is increased, the yield of grain is decreased, with the check plots yielding the highest. With a 100 gallon application of 5 per cent solution under ideal growth conditions, the yields showed a marked increase over the untreated or check plots.

It would appear that the important point in this treatment is the stage of growth when the plot is treated. The test was satisfactory in that stinkweed was destroyed up to 95 per cent and other weeds killed or severely checked.

Under ideal conditions, an increase in yield could be expected from plots treated with the lower concentrations. The main detriment to the commercial use of this method is the cost of application, for special equipment is necessary and the cost of sulphuric acid is high. When present prices for the necessary material are considered, this method is impractical.

CEREALS

Because the University of Saskatchewan situated some fifty miles south at Saskatoon was duplicating the work very largely under similar conditions, and because greatly reduced appropriations were received here, it was found necessary to drastically curtail cereal investigation work at this station in 1932. A few generalizations based on work conducted here follow.

WHEAT.—A number of varieties were tested over a period of years and many were discontinued as inferior to the more commonly grown varieties. Marquis gave the highest yields on the average and is recommended where it ripens early enough to escape frost and where rust is not a menace. Garnet and Reward are recommended in the northern areas where early fall frosts are common and where starchy kernels occur in most of the late maturing varieties.

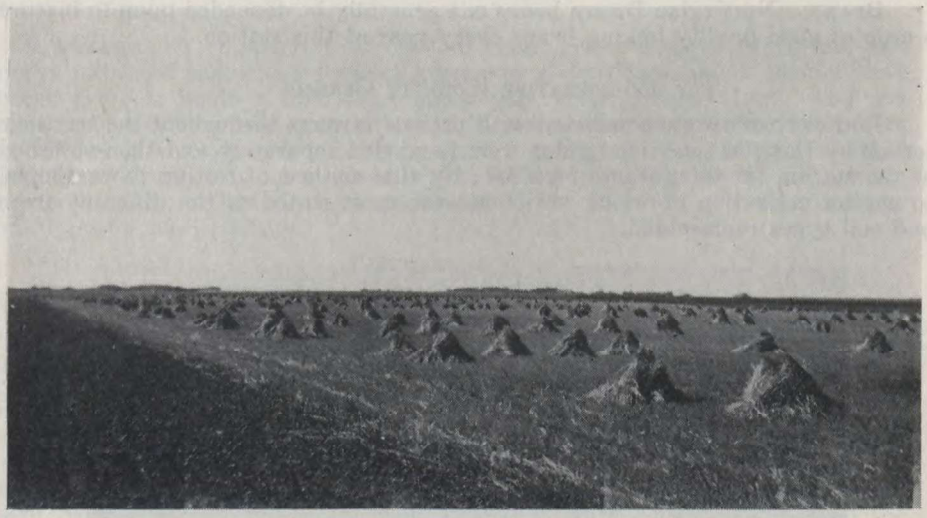

FIG. 28.—A field of Garnet wheat on the station.

OATS.—Banner and Victory have proved the most satisfactory varieties tested here for general purposes. Where an early oat is desired, Gopher has served very well, although the yields have been less than with Banner and Victory. Gopher is about seven days earlier than Victory and produces a good quality of grain. It is somewhat shorter in the straw and is less liable to lodge if the crop is heavy. Laurel is a high yielding hulless variety being used extensively for pig and poultry feeding. It is a medium early maturing variety and is strong in the straw.

BARLEY.—A number of barleys representing various types have been tested. Trebi and Hannchen topped the list in yield for a six-year average. Trebi is primarily a feed barley and produces well over a wide area. The grain is coarse and the awns difficult to thresh off. Hannchen, a two-rowed barley, has not so wide an adaptation and is recommended chiefly for the drier areas. It has a tendency to lodge. O.A.C. 21 is still recognized as the malting barley and is

recommended for that use. Colsess, a high yielding, hooded type, is recommended as a greenfeed barley as it has a strong leaf growth and no awns. As a grain feed it is inferior to other barleys because of its high percentage of hull and low bushel weight. Regal, one of the later introduced varieties, has proven exceptionally satisfactory in this district. It has a wide range of adaptation and is recommended for all parts of Saskatchewan as a feed barley, being a high yielding, strong strawed variety of the smooth awned type. It does not appear satisfactory, however, from a malting standpoint.

FLAX.—Of the several varieties of flax tested here, Bison is recommended on account of its resistance to wilt, its good quality and high yield. Crown gave yields about equal to Bison but suffers severely where wilt is present. Redwing, a relatively new variety gaining prominence to-day has not been tested here, but it is recommended for the northern areas of Saskatchewan. It is wilt resistant and is a high yielder.

PEAS.—Chancellor is one of the most satisfactory field peas tested here. It is medium early, small seeded, and produces a good length of straw. If grown for grain, it yields well, matures about with Banner oats, and threshes without excessive splitting. When grown in a mixture with oats in this district, the peas should be sown about a week ahead of the oats.

BEANS.—Norwegian Brown beans can generally be depended upon to mature a crop of good quality baking beans every year at this station.

CO-OPERATIVE WORK IN CEREALS

Rod row tests were conducted with various farmers throughout the territory served by this station. The grains were harvested separately and then threshed at the station for tabulation of yields. By this method of testing it was hoped to get an indication of which varieties were most suited to the different areas and soil types represented.

FIG. 29.—Farmers' rod row plots at the Rosthern Experimental Station in 1936.

In recent years, this station has done much inspection work and testing of varieties in connection with junior co-operators sponsored by the Saskatchewan Wheat Pool. Members of the staff have also done identification work in connection with the Crop Testing Plan sponsored by the Searle and allied Grain Companies. During the past three years, labour and supervision have been supplied for testing from 200 to 900 farmers' samples at this station as part of the Crop Testing Plan. Special Crop Testing Plan field days are held here every summer.

FORAGE PLANTS

As forage experiments at this station were just nicely under way when they had to be discarded, results are only available for from one to three years and can not be considered definitely conclusive. Some of the more conclusive results follow:—

1. Oats harvested before maturity made one of the most certain annual hay crops, and are relished by all classes of live stock.

2. The addition of a percentage of peas to the oats increases the protein food value of the forage and makes it much more desirable for many classes of live stock. In tests conducted here, Chancellor peas, seeded equal amounts of oat and pea seed by weight, provided the highest yield. Arthur also gave a high yield but caused slight lodging. In all tests the peas were sown first and the oats one week later. Banner oats, being strong strawed, were used in the test.

3. Sweet Clover.—Of the various strains tested, the apparent quality of the Alpha strains was better than that of the other varieties.

4. Alfalfa.—Many of the strains tested and listed as varieties were strains of standard varieties from different sources, and their habit of growth was similar. All the Grimm strains were superior to the other varieties.

5. Grasses.—A comparison of crested wheat grass, western rye grass, and timothy indicated that crested wheat grass was a somewhat higher yielder than western rye. It made a finer, and apparently better quality hay. The sod broken from crested wheat grass after two years' seeding was much denser than that following western rye, indicating a more extensive root system. Crested wheat grass starts growing a week or more before western rye in the spring, combats drought well, and stays green late in the summer, and should prove more desirable as a pasture.

Pasture Crops

Pasture crops which have been tested experimentally include the permanent pastures, alfalfa, sweet clover and brome grass; and the annual hog pastures, rape, fall rye, oats and peas in equal proportions by weight, oats, wheat, barley, cereal mixtures, and corn. Alfalfa has proved to be one of the best hog pastures, giving good pasture throughout the season if not over-grazed; but in certain districts alfalfa cannot be depended upon for pasture, and for that reason sweet clover and brome grass have proved to be the most suitable and reliable permanent pastures for hogs in Northern Saskatchewan. Rape has proven to be an excellent pasture, giving good forage and maintaining a growth well on into the season. Oats and peas and other cereal mixtures have also proved to be satisfactory—provided they are not over-grazed. Fall rye has given very good results during the spring and early summer months, being especially suitable for sows and litters and other breeding stock.

The time and rates of seeding of the different hog pastures at Rosthern are as follows:—

Alfalfa with nurse crop (first season not pastured), 12 pounds per acre.

Sweet Clover with nurse crop (first season not pastured), 20 pounds per acre.

Brome grass with nurse crop (first season not pastured), 15 pounds per acre.

Rape, sown about May 1 with grain drill, 7 to 12 pounds per acre.

Fall Rye, sown September 1 to 15 with grain drill, $1\frac{1}{2}$ to $1\frac{3}{4}$ bushels per acre.

Oats, sown early in spring with grain drill, 3 bushels per acre.

Cereal mixtures, sown in spring with grain drill, $2\frac{1}{2}$ bushels per acre.

Corn, sown May 20 to June 1 with grain drill, 20 pounds per acre.

ANIMAL HUSBANDRY

Horses

Only sufficient horses are retained on the station to carry on the necessary farm work. They are chiefly Clydesdale grades; no purebreds have been purchased for breeding, and very little breeding work has been attempted. In the little breeding work which has been carried on, it was found very essential to feed potassium iodide to the brood mares during the pregnancy period as a preventive against joint ill or navicular disease. A dose for a pregnant mare consisted of a small teaspoonful of potassium iodide crystals given regularly twice a month. They can be purchased at any drug store, and are fed with the grain ration.

Fig. 30.—Grade Clydesdale mares and foals.

FEEDING AND MANAGEMENT

Coarse slough grass pasture or hay is not recommended as horse feed, it is washy, high in fibre, and low in digestible nutrients. Prairie wool, a native prairie grass, has proved to be a good roughage if cut before reaching the mature stage. Western rye grass and brome grass are the two dependable domestic hay grasses; they are palatable and give a good tonnage. Well cured western rye grass is not so laxative as brome grass and makes a good feed for horses at heavy work. Well cured green or ripened oat sheaves were found the most dependable feed, giving a far greater tonnage per acre than the native and domestic hay grasses in the district. Oat sheaves proved an excellent feed for conditioning horses and for horses at heavy work.

Oats are the standard grain feed and the safest of all concentrates for horses.

Bran is one of the most beneficial feeds for the idle horse because of its bulky nature and mild laxative properties.

On Sundays and holidays, the station work horses receive a reduced grain ration which consists of two-thirds oat chop and one-third bran. Horses weighing from 1,400 to 1,600 pounds at hard work require about 20 pounds of hay plus 14 pounds of whole oats or oat chop per head per day, whereas idle

horses during the winter months remain in good condition on oat straw with one feed of oats amounting to from 6 to 7 pounds per head per day. Plenty of exercise in a large paddock during the day time is essential for idle horses.

Beef Cattle

For a period of ten years, a number of feeder steers were purchased in the autumn and fed until spring. During the past few years, the natural increase in the dairy herd has not permitted feeding tests with steers, the extra roughage and coarse grains available being required for the dairy herd.

One of the last experiments conducted was to determine the value of ground wheat and cut oat sheaves compared with ground barley and cut oat sheaves as a ration for fattening yearlings.

Sixteen yearling grade Shorthorn steers and four heifers of identical age and breeding were divided into two equal and uniform lots as to weight, thrift, type, etc. One lot was fed coarsely ground wheat (finely ground wheat caused digestive disturbances); the other was fed ground barley. An equal quantity of feed by weight was fed daily to each lot, and individual weighings of the cattle were made at monthly intervals.

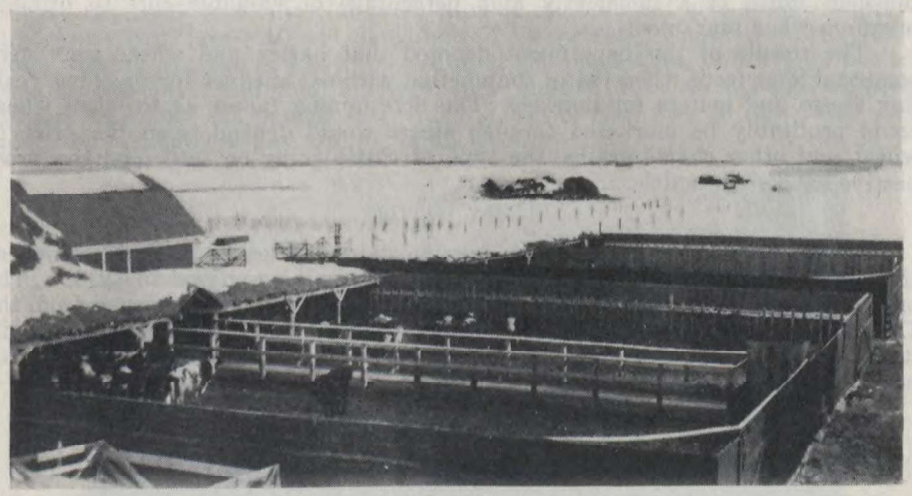

Fig. 31.—Corrals at the Rosthern Experimental Station, showing a convenient arrangement for steer feeding.

The test lots were wintered in adjoining corrals. Each corral was 40 by 80 feet in size and was enclosed on three sides by an 8 foot solid board fence. A portion of the north side of both corrals was covered to give the cattle protection against weather and to provide comfortable resting quarters. This arrangement was not costly and proved very satisfactory. At the south end of the corrals, one water trough was placed in which a tank heater was installed to remove the chill from the drinking water. Coarse salt was before the cattle at all times.

The two lots were fed at three regular intervals during the day. The grain was mixed with the cut oat sheaves at the time of feeding and there was practically no waste. Both lots relished their rations, the wheat lot taking to their feed a little better throughout the test. During the period on test, namely 84 days, the average daily consumption per animal was 17 pounds of cut oat sheaves plus 5 pounds of threshed grain. In the 17 pounds of ripened oat sheaves, there was approximately 5 pounds of grain. On the average, each animal required 12 pounds of roughage and 10 pounds of grain per day.

The average daily gain per animal was 2.19 pounds in the barley lot and 2·38 pounds in the wheat lot, a small difference of only 0·19 pounds in favour of the wheat lot.

When wheat was valued at 50 cents per bushel and barley at 20 cents per bushel, the cost to produce a hundred pounds gain in weight was $3.59 for the barley lot and $4.15 for the wheat lot, a difference of 56 cents in favour of the barley lot.

Twenty pounds more barley and 62 pounds more cut oat sheaves were actually required to produce 100 pounds gain in the barley lot as compared with the wheat lot.

Observations and individual weighings during the feeding trial clearly indicated that one of the most important factors in finishing yearlings was the type and conformation of the individual animals selected for the feed lot. The low set, square framed animal, strong in constitution, with a short broad head and a large muzzle carrying only fair fleshing, produced not only the maximum gains, but the most economical gains and would sell at a premium on the market and bring the highest net returns. The rangy steer, shallow in the heart region, with a long narrow head and a small muzzle, proved to be a nervous individual, shy on the feed trough, making poor gains and poor use of his feed, never carrying sufficient finish or a sufficiently high percentage of valuable cuts to bring a premium when marketed.

The results of this experiment denoted that barley and wheat were very comparable as feeds when fed in conjunction with oat sheaves for finishing yearling steers and heifers for market. The determining factor as to when wheat could profitably be marketed through steers would depend upon the price of wheat and other coarse grains, the type of cattle going on feed, and the prospective market for cattle.

Dairy Cattle

A very select herd of Holstein-Friesian dairy cattle has been developed at this station, chiefly from two pure-bred heifer calves purchased in 1914. The only other female additions to the herd consisted of six cows transferred from the Dominion Experimental Station at Lethbridge, Alberta, in August 1934 to facilitate the study of a breeding irregularity. The herd has averaged about fifty head.

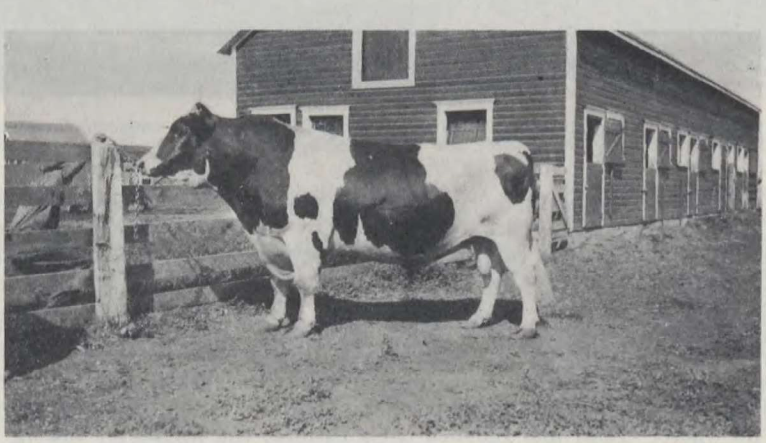

Fig. 32.—The senior herd sire, Colony Heilo Dekol Romeo 99054, as a four-year old. An outstanding individual in Holstein type and conformation, he is a sire of outstanding progeny. His daughters are uniform in type and conformation and have well developed mammary systems with pronounced veining and well attached, well balanced udders.

The last five herd sires used in service were XX bulls in Advanced Registry. They have had a strong influence on stamping uniformity in type and conformation. The policy is now to concentrate on line breeding to intensify the blood lines of several closely related proven sires whose progeny have outstanding records to their credit. This is being done in an effort to determine the influence this system of breeding will have on unifying type and production without sacrificing the vigour and health required in a high-class breeding establishment.

The highest producing cow developed so far was R.E.S. Madrigal Gypsy Keyes 68180, which produced over 20,000 pounds of milk with a 4·23 per cent butterfat test in a lactation period. The herd is now on twice-a-day milking, and on this basis, the two-, three-, and four-year-old cows in the herd have as a group consistently higher production and butterfat records than their dams. Eleven two-year-old daughters sired by Agassiz King Pietje Canary 63093 produced on the average 9,679·5 pounds of milk and 351 pounds of butterfat, with a 3·63 per cent butterfat test, in 346 days, as compared with an average of 10,227 pounds of milk and 376 pounds of butterfat, with a 3·67 per cent butterfat test, in 330 days from twelve daughters sired by a succeeding herd sire, Colony Wimple Sir Bessie 73928, and mostly out of daughters of Agassiz King Pietje Canary. The sire, Colony Wimple Sir Bessie, not only increased the average milk and butterfat production of the herd but also greatly improved the type. Six three-year-old daughters of his recently completed their R.O.P. tests with an average of 12,545 pound milk, 450 pounds fat, and a 3·59 per cent test, in 340 days, and four four-year-olds finished with an average of 12,603 pounds milk and 452 pounds fat, with a 3.59 per cent test, in 334 days. The cows were on twice-a-day milking in all tests.

FIG. 33.—The purebred Holstein female, Lady May Korndyke Posch 219813, which as a five-year-old produced 14,280 pounds of milk and 525 pounds of fat, with a 3·68 per cent butterfat test, in 305 days on twice-a-day milking in R.O.P.

The average yearly butterfat test for the entire herd for the years 1930 to 1936 was as follows: 1930—3·69 per cent, 1931—3·67 per cent, 1932—3·63 per cent, 1933—3·62 per cent, 1934—3·53 per cent, 1935—3·73 per cent, and 1936—3·67 per cent, which compares with the 3·4 per cent Holstein standard.

The Holstein herd at this station successfully passed its sixteenth accreditation test in 1936.

A project with contagious abortion has been carried on in co-operation with the Health of Animals Branch. All animals are subjected to the agglutination and complement fixation blood tests for contagious abortion. The entire herd gave negative reactions to the test during the years 1928 to 1936 inclusive.

Mineral Deficiency

Ill effects traced to lack of minerals are depraved appetite, stiffness, goitre, enlarged joints, and cessation of oestrum. The possibility of any danger resulting from mineral deficiency has been successfully combated at the Rosthern station by feeding the following mineral mixture as part of the ration for dairy cattle:—

Powdered limestone	60 lb.
Animal bonemeal (fine)	20 "
Common salt (fine)	20 "

this being added at the rate of 3 pounds of mineral mixture to 100 pounds of meal.

The feeds grown in the Rosthern district are low in calcium and phosphorus, and the above mineral mixture has been found an excellent corrective of this deficiency.

Pastures for Dairy Cattle

The duration of the grazing season varies somewhat from year to year, ranging from 120 to 150 days (4 to 5 months). Even during the short grazing season it is often necessary to feed extra green feed or supplementary grain rations to cows in milk on pasture in order to maintain the milk flow.

The common pastures are: (1) native prairie wool, red top, and slough grasses, (2) domesticated grasses and clovers such as brome grass, western rye grass, crested wheat grass, sweet clover, and alfalfa, and (3) annual pastures: fall rye, spring rye, oats, barley, wheat, and cereal mixtures.

Because of heavy grazing and lack of moisture, the native pastures have failed almost continuously, and in consequence many farmers are considering re-seeding with hardy, palatable domesticated grasses which stand heavy and close grazing. Brome grass has proved to be hardy, fairly dependable, succulent, and very much relished by all classes of live stock. Fairly early in the spring and in June and early July it gives good pasturage, but very little in late summer and the fall months in dry seasons.

Crested wheat grass shows great promise, will stand close grazing, and provides pasture very early in the spring and in late summer and fall when most other grasses are dormant and lifeless. Cattle and sheep at this station were turned out at least two or three weeks sooner because of the growth made by the crested wheat grass, and the cattle were permitted to remain for two or three weeks longer on the aftermath of crested wheat grass, which meant a considerable saving in feeding.

Western rye grass gives only fair pasture unless there is more than average rainfall.

Sweet clover gives exceptional stands of forage for grazing in certain years, but the lack of dependability of this crop has been the big drawback.

Spring and fall rye will give a good yield of luscious grass, but because of a peculiar flavour which is quite noticeable in the milk and cream, it is considered out of the question for milk cows. For dry cows or growing stock, it makes a good pasturage.

Trigonella clover, which has been tested out in test plots, has an objectionable feature very similar to the rye pastures in that it taints or flavours the milk and thereby lowers the quality and grade of both milk and cream.

Rearing Dairy Calves

At the station, the new born calf receives new milk for one month and is then changed gradually to skim milk, receiving 14 to 18 pounds per day. After one month of age, a strong vigorous calf will take 20 pounds of skim milk in two feeds per day together with flax seed jelly.

Flax seed jelly is made by adding 2 pounds of flax seed to 10 pounds, or 1 gallon, of boiling water and allowing to boil for one hour. When cool, the flax seed jelly is added to the skim milk at the rate of one-quarter cup to 7 pounds of skim milk, gradually increasing to 1 cup of jelly to 10 pounds of skim milk. Flax seed jelly has proved an excellent substitute for the fat in whole milk. Calves on test fed skim milk and flax seed jelly made gains comparable to those made on new milk.

The most satisfactory grain ration which has been used at the Rosthern station for growing and developing young calves is made up as follows:—

Ground oats	400 pounds
Ground barley	300 "
Ground wheat	300 "
Bran	300 "
Powdered limestone	30 "
Finely ground animal bonemeal	10 "
Common salt	10 "

This ration is fed at the rate of from one-half pound to 4 pounds per day depending upon the age and thrift of the individual calf. The calves at the station are started on one-half pound per day at 4 to 5 weeks old and receive the 4 pounds at 6 months of age.

Sheep

The station flock of breeding ewes has ranged in numbers from twenty to forty head. The first nucleus of sheep purchased were range bred ewes of Rambouillet breeding, which proved hardy, vigorous, good foragers, shearing high quality fleeces. Purebred Leicester rams were mated to the range bred ewes for the purpose of improving the mutton qualities of the Merino, which are inclined to be lacking in mutton conformation. The select ewe lambs of this cross were retained in the flock and mated to Leicester rams until a very typy flock of graded-up Leicesters was developed.

Fig. 34.—Purebred Leicester and Suffolk × Leicester cross-bred market lambs on white sweet clover pasture at the Rosthern Experimental Station. The dark-faced lambs represent the cross-breds.

The well bred Leicester ewes were not as hardy nor as well adapted to either the climatic or grazing conditions as the original range-bred ewes or the first cross sired by a purebred Leicester ram. Moreover, the open fleece of the Leicester was a most undesirable feature in that the snow lodged on the broad backs of the graded-up Leicesters and colds and pneumonia were quite prevalent in the flock. The results of this breeding project indicate that a breed of sheep which possesses a dense fleece is most desirable for Northern Saskatchewan. Both the Merino and Down breeds come in this category.

A purebred Suffolk ram was purchased and mated to the graded-up Leicester ewes to improve the hardiness and early maturing qualities of the progeny. The Suffolk × Leicester cross-bred lambs proved very thrifty, more compact in form, and possessed the necessary finish at the required market weights to command the top price on the open market. This breeding practice was followed until the graded-up Leicester ewes had passed their period of usefulness, when the entire flock of Leicester and cross-bred ewes were marketed. This breeding project demonstrated that a well bred flock of Leicesters bred back to a purebred Leicester ram was an unprofitable venture for Northern Saskatchewan conditions.

A nucleus of twenty purebred Shropshire ewes and a purebred imported Shropshire ram were transferred from the Central Experimental Farm, Ottawa, to this station for testing for suitability to the district. The Shropshire breed, belonging to the Down class, is a very low set compact breed, the lambs finishing with a very desirable finish at the required market weights and possessing a dense fleece. The Shropshire flock has proved hardy, thrifty, prolific, and a breed well suited for a small farm flock in Northern Saskatchewan. The purebred Shropshire rams mate well with ewes of range Rambouillet and nondescript breeding and the Shropshire type is fairly pronounced in the first cross. The Shropshire breed is a good example of combined wool and mutton sheep. The fleece is dense, uniform, and fairly fine, averaging from eight to ten pounds in weight. The required standard for the Shropshire fleece is medium staple ⅜ blood. There are other Down breeds of sheep, such as the Hampshire and Suffolk, which would possibly fit into a small farm flock of from twenty to fifty ewes and prove very comparable to the Shropshires; and for a large flock, range bred ewes of Rambouillet blood lines would possibly prove hardier and better foragers on a large range or tract of native pasture. Furthermore, such range bred ewes have developed the herd instinct, which is very essential in a large flock.

FLUSHING OR CONDITIONING THE EWES

Experimental tests at the Rosthern Station have proved that ewes gaining in body weight during the breeding season gave a much higher percentage lamb crop than when they were failing in condition or were in comparatively thin flesh. The practice was to move the ewes as soon as they were weaned and dry to a pasture with good growth, allowing them only a few hours on the pasture each day until accustomed to the change in feed and also as a precaution against bloat. Fall rye has proved a good crop for flushing ewes. It is sown at the rate of 2½ to 3 bushels per acre in drills or broadcast in August or not later than September 10th. When the rye shows well above the ground, it is ready for grazing. Rape has also proved a good pasture. During a dry season, it is very difficult to get a good growth, and for that reason it has not been found a dependable crop for fall pasturage. In a wet season, the growth or aftermath on stubble was often sufficient to supply copious feed for the breeding ewes, and to bring them into good condition before the breeding season commenced. Alfalfa and sweet clover are also recommended pastures.

In a very dry season, when the annual pastures were a complete failure and when growth on the stubble fields was scanty, it proved profitable to feed a

small quantity of grain (one-half to 1 pound of grain per ewe per day) until the ewes were making good gains, so as to ensure a higher percentage lamb crop. Ewes in good breeding condition at the time of breeding required very little grain during the pregnancy period. The average lamb crop at the station has been 125 to 150 per cent.

The stud rams require to be in vigorous condition at all times of the year. A month prior to and during the breeding season, the rams require grain. At this station, a ration consisting of two parts whole oats and one part bran has given the best results. A mature, well nourished ram will cover nicely forty to fifty ewes during a breeding season; but a well developed ram lamb should not have more than twenty ewes to ensure good, strong, vigorous lambs. It was advisable to remove the rams from the flock during the day time or vice versa, for when this practice was followed, the rams held their condition and required less grain.

FEEDS AND FEEDING

The common feeds grown in the district which have proved satisfactory for sheep at Rosthern are: dry roughages—green oat sheaves, ripened oat sheaves, upland hay, brome-grass hay, and well cured, fine sweet clover hay; succulent

FIG. 35.—Ewes feeding at slatted feed racks at the Rosthern Station. The slatting prevents feed from falling on the wool.

roughages (fed in very limited quantities)—sweet clover ensilage, sunflower ensilage, corn ensilage, oat bundles as ensilage, and turnips. Lambing results have proved that pregnant ewes should not receive over 2 pounds of ensilage per ewe per day and preferably from 1 to 1½ pounds per day. Ewes over-fed on ensilage gave birth to large, soft, flabby lambs; they required assistance to lamb, and often the lambs died shortly after birth.

Where no succulent feed was available for the pregnant ewes, it was found advisable to add one-third of bran to the grain ration and feed three-quarters to 1 pound of grain per ewe per day for 2 months prior to the lambing season. Ewes fed solely on dry roughage, such as ripened oat sheaves, occasionally suffered from expulsion of the uterus before, or at, lambing time.

A satisfactory meal ration for creep feeding young lambs while nursing consists of 4 parts whole oats, 4 parts bran, and 1 part oil cake meal by weight.

Fall and spring rye have proved to give excellent pasture for ewes and lambs during the spring and early summer months.

Iodized block salt was kept before the entire flock throughout the year. During the pregnancy period, the ewes had access to coarse salt to which was added potassium iodide to ensure against goitre in the lambs. One ounce of potassium iodide crystals is dissolved in a pint of warm water and the solution is sprinkled over 25 pounds of coarse salt.

MANAGEMENT AND DISEASE

Mortality in young lambs during the late winter months was caused chiefly from wool ball or binder twine. It was found necessary to take precautions by clipping off loose wool on the flanks and belly immediately following lambing and placing the wool clippings in a sack. Twine from grain sheaves fed to ewes should not be dropped in the sheep runs.

Sore or inflamed eyes have been prevalent among young lambs of about a week old. It was found advisable to isolate infected lambs and bathe their eyes with boracic acid and warm water.

When a case of bloat develops in the flock, the administering of 4 to 6 fluid ounces of raw linseed oil usually removes the condition.

A practice of docking all and castrating male lambs at two to three weeks after birth is followed at this station.

SWINE

The pure-bred Yorkshire herd of swine at this station has maintained a high standard of quality, balance, smoothness, uniformity, and prolificacy. The constant improvement in the type of the herd, the feeding propensities of the litters, and high quality of carcasses could be credited chiefly to certain boars and sows which were used.

The boar, Rosthern King Cid 25 -159656-, bred at this station and later sold, showed promise as a suckling pig, and as a junior two-year-old was class winner and Senior and Grand Champion boar at the 1933 Toronto Royal Winter Fair, facing very strong competition. He proved to have the power to transmit his desirable qualities to his progeny, his get also carrying off many prizes at the same show. At the 1934 Toronto Royal, Cid 25 repeated his Grand Championship winnings. Both his sire and dam were qualified in Advanced Registry for swine.

Since the inception of Advanced Registry, over thirty of the station's Yorkshire sows and four Yorkshire boars have qualified under its tentative standards.

SWEDISH YORKSHIRE HOGS

Eight Swedish Yorkshire boars were imported into Canada in May, 1934, by the Dominion Department of Agriculture. These boars were held in quarantine until autumn, when several of them were sent out to different branch farms for experimental breeding purposes and for testing the progeny against the pure strains of Canadian Yorkshires. The boar, Vilhelm of Svalof (imp.) -179615- was received at the Rosthern Station.

" Vilhelm " developed into a massive individual, very muscular, with good length, depth, and width of body, fairly long well muscled hams, strong, heavy bone and pasterns. His head would be described as rather plain as compared with many of the Canadian Yorkshires but it exhibits strength by width at the poll and between the eyes.

The Swedish Yorkshire boar was bred to a representative selection of the Rosthern sows and the resulting progeny were placed on the Advanced Registry test to determine the maturity index and carcass test as against the straight

Canadian Yorkshires. The results of this test proved that the two strains were about equal in rapidity of gains in weight and thrift. Many of the progeny of the Swedish Yorkshire cross proved to score approximately ten points higher on carcass test, for they were superior in evenness of back fat, bellies, and hams. As to scoring on shoulders, the results were very comparable for both strains. Further studies will be necessary before any definite conclusions can be arrived at as to the advantage of introducing Swedish Yorkshire boars and mating them with Canadian Yorkshires over the pure lines of Canadian Yorkshires.

A COMPARISON OF THE SELF-FEEDER WITH HAND FEEDING FOR FINISHING MARKET HOGS

Two uniform lots of ten pigs each were used in this test. The composition of the ration for both lots was identical. Dry feed was before the self-feeder lot at all times. The pigs in each lot averaged 106 pounds at the beginning of the test. After sixty days on test the self-feeder hogs averaged 200 pounds and the hand fed lot, 194 pounds.

The gains made by each lot were fairly comparable, the self-feeder lot showing a slightly higher gain per pig for the period. The meal requirement was 19 pounds less for 100 pounds gain in weight in the hand fed lot, and the cost to produce 100 pounds gain was 27 cents less.

As regards the individuality of the hogs at market weight, the hand fed group were very trim, grading a higher percentage of selects on foot, while the self-feeder group were on the whole deeper bodied hogs, showing more finish.

By careful adjustment and by providing shelter for the self-feeder, the waste can be practically eliminated. The self-feeder method of finishing hogs will undoubtedly prove most satisfactory and more profitable than the hand feeding method on farms where it is difficult or inconvenient to regulate the daily feeding periods.

A COMPARISON OF WHEAT, BARLEY, AND OATS WITH A STANDARD RATION FOR GROWING MARKET HOGS

This experiment was designed to compare the value of wheat, barley, and oats when fed alone with a standard hog ration made up as follows:—

200 pounds barley chop
100 pounds shorts
100 pounds ground wheat
14 pounds tankage
10 pounds oil cake meal
5 pounds fine bone meal.

Four uniform lots of ten pigs each, averaging 56·5 pounds each in weight, were used in the test. Each lot had access to a rape pasture throughout the test and each was kept under similar conditions. The three lots which received respectively the oat ration, the barley ration, and the wheat ration developed a scurfy condition of the skin after one month on feed. This was more noticeable in the oat lot than in either the barley or wheat lot. The oat lot also appeared to be very unthrifty, showing a pronounced wrinkling of the skin. The wheat and barley lots compared very favourably throughout the test, the wheat lot showing on the whole a little more condition and more uniformity. As the period advanced, the scurfy condition was not so pronounced in either of these two lots. The hogs fed the standard ration continued to thrive, finished the test in a thrifty condition, and were as a group a very desirable class of market hogs.

All the hogs were on test for a period of 90 days. The average gain per pig during the period in each lot was: standard ration, 107·7 pounds; ground wheat, 103·3 pounds; ground barley, 94·4 pounds; and ground oats, 88·2 pounds.

The following conclusions were drawn from the experiment: (1) The standard ration proved superior to any of the single grain rations for growing pigs; (2) Oats proved much inferior to the other rations used; (3) The standard ration produced the most rapid gains and was followed in order by wheat, barley, and oats; (4) It required less of the standard ration to produce 100 pounds gain, followed by wheat, barley, and oats in that order; (5) Barley proved to be the most economical feed used in the test; (6) The supplementary feeds contained in the standard ration were fairly high in price, which explains the difference in economy of gains in favour of the single grains.

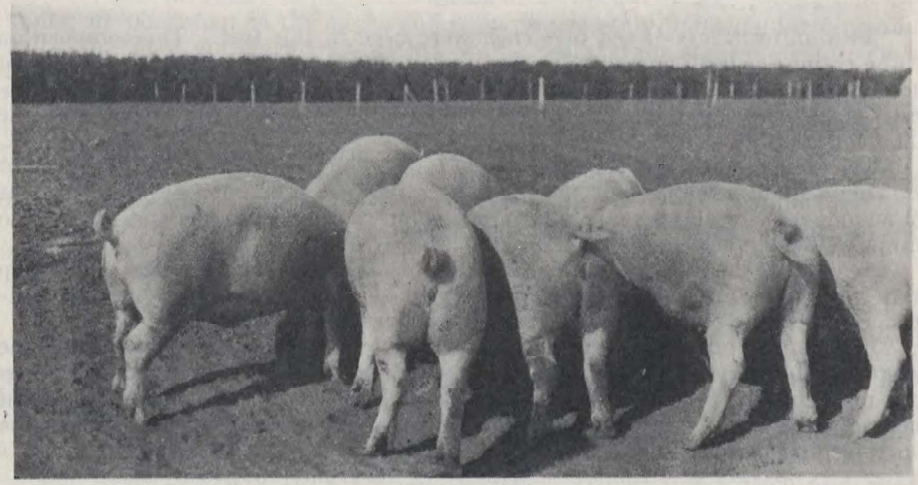

FIG. 36.—A group of market hogs raised on the standard ration.

A COMPARISON OF WHEAT AND BARLEY FOR FINISHING MARKET HOGS

In response to numerous inquiries received regarding the value of wheat as compared with barley for finishing live stock when its monetary value was very low, an experiment was arranged to test the respective merits of wheat and barley as feeds for finishing market hogs.

Two uniform lots of eight hogs were used in the test. Both lots were kept under similar conditions throughout. The wheat was coarsely ground, as finely pulverized wheat chop caused digestive troubles. The feed was fed in a thick slop. The average weight of the individual hogs at the beginning of the test was 103·5 pounds, and at the conclusion of the sixty-day testing period the barley lot averaged 177·4 pounds as compared with 188·8 pounds for the wheat lot.

It was found that: (1) Wheat proved to be superior to barley as a feed for finishing market hogs when the meal in each case contained 6 per cent tankage; (2) Both lots relished their feed equally well; (3) The wheat lot showed individual gains of 11·5 pounds more than the individual pigs in the barley lot; (4) The feed requirement was 65·7 pounds more per 100 pounds gain in weight in the barley lot; (5) The quality of the finish was equally good in both lots.

The results of this test indicated that when wheat was low in price, it could be marketed to good advantage through market hogs.

A COMPARISON OF HULLESS AND COMMON BARLEY FOR MARKET HOGS

With a fairly constant increase in the acreage of hulless barley in Northern Saskatchewan, which gave yields comparable with common barley and found no special demand, it was deemed advisable to compare it as a feed with common barley for market hogs.

Two uniform lots of twelve pigs each, placed under similar conditions, were used in the test. Both lots were kept in dry lots, and the meal was fed in a thick slop.

The two types of barley appeared to be equally relished by the hogs and the difference in gains was very small. It required 13 pounds less of hulless barley to produce 100 pounds gain in weight. The two lots showed no difference in type.

PEAS IN A RATION FOR SWINE

In Northern Saskatchewan, the yield of the Chancellor variety of field peas compared favourably with the yield of wheat. In view of this fact, an experiment was conducted to test the value of peas in a ration for growing pigs.

Two uniform lots of ten pigs each, placed under similar conditions, were used in the test. Each lot received a ration consisting of 100 pounds of oat chop and 100 pounds of barley chop with 100 pounds of finely ground peas being added to the ration of one lot.

The addition of peas to the ration improved the palatability, and 50·5 pounds less feed was required per 100 pounds gain in weight. In the seventy-day feeding period during which the test was under way, the incorporation of peas in the ration increased the gains per pig by 9·7 pounds. Peas added more variety to the ration, and the pigs in the pea lot showed more bloom and a firmer finish.

A COMPARISON OF POTATOES, BARLEY, AND A COMBINATION OF POTATOES AND BARLEY AS FEEDS FOR GROWING HOGS

As many farmers in Northern Saskatchewan have found themselves at times with a large surplus of unsaleable potatoes on hand, an experiment was outlined to determine the value of potatoes as a hog feed.

Four uniform lots of twelve hogs each were carefully selected and retained under identical conditions during the test. One lot received only cooked potatoes; the second, ground barley; the third, a combination ration of cooked potatoes and barley; and the fourth, the standard hog ration referred to above in connection with the experiment in which single grains were compared. A mineral mixture was supplied to all lots in separate containers.

The pigs averaged 74 pounds in weight at the beginning of the test which extended for 54 days. At the end of the test period the pigs fed the standard ration averaged 140·8 pounds in weight as compared with a weight of 134·6 pounds for the barley lot, 125·8 pounds for the lot fed the combination ration of cooked potatoes and barley, and 101·7 pounds for the cooked potato lot. The pigs fed solely on cooked potatoes seemed to relish their feed at the close of the test; but they lacked in balance of conformation, being heavy in the middles and loose and flabby, and their skin being quite wrinkled in the region of the hams. The odd pig scoured in this lot, and a slight scurfiness was also observed on a few. Cooked potatoes fed in combination with barley produced satisfactory gains. When cooked potatoes were fed alone, 560 pounds proved equivalent to 100 pounds of barley; whereas when fed in combination with barley, 219 pounds were found to have a replacement value of 100 pounds of barley.

The results of this experiment would indicate that cull or unmarketable potatoes could be utilized to good advantage when cooked and fed in combination with a grain ration.

SHELTERS FOR WINTERING HOGS

At the Rosthern Station, banked colony houses, straw shelters constructed of poles, and straw stacks were found the most suitable type of shelters for wintering brood sows and market hogs. Pigs housed in a piggery or a barn often developed rickets or rheumatism, making poor gains and showing heavy mortality.

FIG. 37.—Colony houses banked for winter on the Rosthern Station. The location south of a dense caragana hedge furnishes ideal conditions for wintering sows and market hogs.

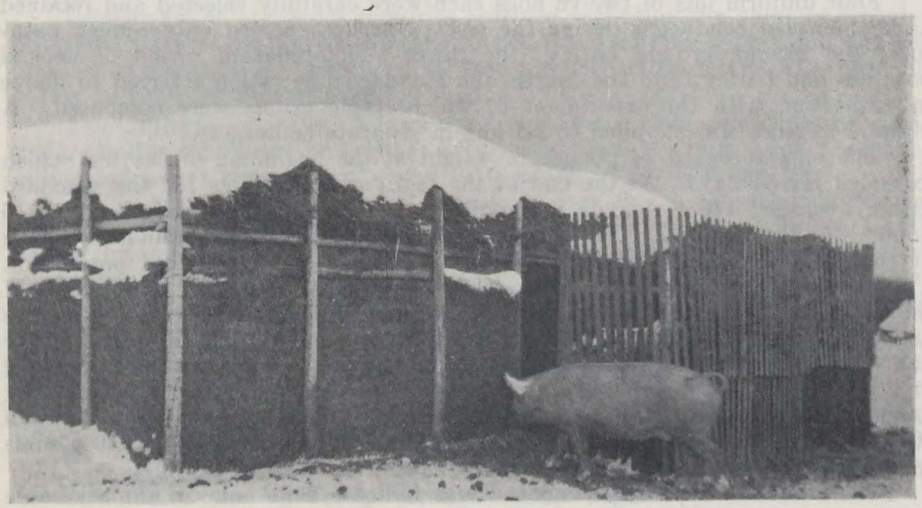

FIG. 38.—Straw shelter for wintering brood sows on the Rosthern Experimental Station.

POULTRY

The station's poultry flock consists entirely of Barred Plymouth Rocks of the bred-to-lay strain. The average egg production per bird has been consistently high: six birds to date have completed their pullet year with over 300 eggs, and the average egg weight per bird for the entire flock is well over 24 ounces per dozen. Special attention has been given to type, colouring, barring, body weight, and the elimination of all birds with standard disqualifications.

THE BEST MONTH FOR HATCHING

Hatching results for February, March, April, and May settings were summarized for a number of years. The April settings contained the largest percentage of fertile eggs and fertile eggs hatched, the March and May settings following closely. In February, the fertility was particularly low, with more weak germs and chicks dead in the shell.

COD LIVER OIL AS A SUPPLEMENTARY FEED FOR POULTRY

Experimental tests have confirmed the recommendation that cod liver oil was of value for increasing winter egg production and egg size, for hatchability, for maintaining body weight, and for promoting health and vigour in the flock.

Two carefully selected pens of forty birds were placed on test from November 1st to April 30th on feeds similar in every respect except that one pen received cod liver oil in the laying mash during the test period.

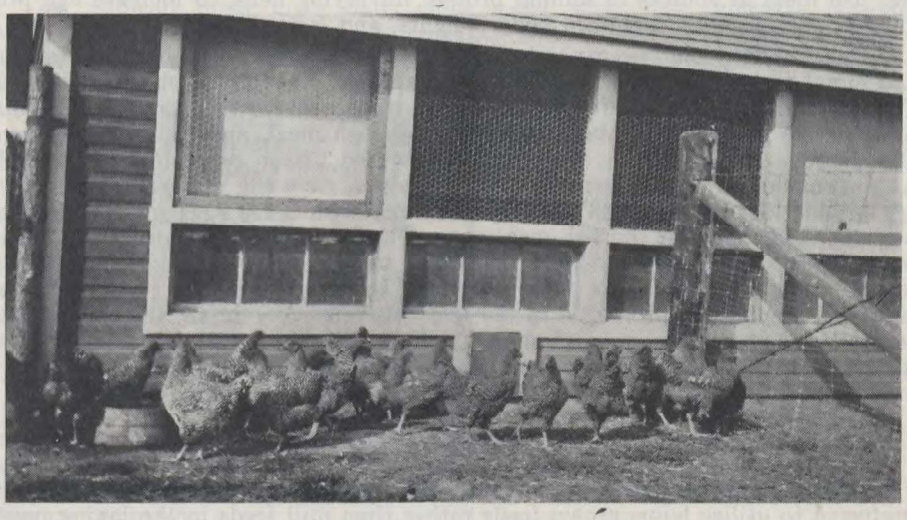

FIG. 39.—Barred Plymouth Rock pullets in front of a laying house on the Rosthern Experimental Station.

The egg production for the cod liver oil pen was 285 dozen as compared with 256 dozen for the check lot—a difference of 29 dozen in favour of the former. This cod liver oil pen gave its heavy production during the first three months on test, November, December, and January, when eggs were selling at their high price. The addition of the oil more than compensated for the extra cost. One of the most striking differences between the two pens was the influence of the oil on improving the egg weights. Cod liver oil appeared to assist in retaining fairly constant body weights in the birds which were high producers, whereas the heavy layers in the check lot showed fluctuating weights, generally on the down-

ward trend. The birds fed the oil averaged close to six pounds throughout the test. The consumption of mash was also greater in the oil pen, slightly less scratch grain being required than in the check lot. During the months of February and March, the hatchability of eggs from the cod liver oil pen was considerably higher than it was of those from the check pen. Pilchard oil has given fairly comparable results with birds on test.

DRY MASH VERSUS WET MASH

An experiment was outlined to test the influence on increased egg production of feeding wet mash at noon plus dry mash throughout the day as compared with feeding dry mash exclusively.

Two uniform selected pens of sixty birds each were placed on test for a period of six months commencing November 1st. Although the birds appeared to relish the wet mash at noon, records of egg production of the two pens indicated that there was very little influence from feeding it. The findings indicated that the hot wet mash possibly influenced birds which were slow in coming into production, or acted as a stimulant to birds which had been checked in their production by adverse cold spells. The extra labour involved in preparing and feeding the wet mash constantly would hardly warrant its use.

PROTEIN SUPPLEMENTS FOR A LAYING MASH

An experiment was arranged to test the relative value of beef scrap, tankage, and fish meal as sources of animal protein for laying hens, to increase egg production, egg weights, maintain body weights, and lessen mortality.

One hundred and twenty selected pullets were divided into three uniform and equal pens, and placed on test for the period November 1st to April 30th. The only difference in the feed supplied the three pens was the source of animal protein, one pen receiving beef scrap, another fish meal, and the third tankage. The protein supplement in each case represented fifteen per cent of the mash. At the conclusion of the test, the beef scrap pen gave the greatest response for egg production, laying 3,063 eggs as compared with 2,499 eggs for the tankage pen and 2,486 eggs for the fish meal pen. The average egg weights for all pens were very comparable. This also applied to individual body weights. The cost to produce a dozen eggs was in favour of the beef scrap pen, but it was felt that since the number of birds used in the test was relatively small, the results with respect to the various sources of animal protein were not sufficiently conclusive to justify definite recommendations being made without first repeating the experiment with larger pens. The mortality was negligible in all three pens.

GROUND WHEAT AS A SUBSTITUTE FOR BRAN AND SHORTS

This experiment was outlined purposely for the benefit of the farmer who preferred to utilize home grown feeds rather than mill feeds in the laying mash. Two uniform pens of forty pullets each were put on test, one pen receiving ground wheat and the other bran and shorts in equal proportions by weight, the weight of the bran and shorts equalling the weight of the ground wheat. The feed received by both pens was identical in all other respects. The experiment began on November 1st and ended on April 30th.

The average egg production per bird was 90·8 eggs for the ground wheat pen and 86·59 eggs for the bran and shorts pen. The feed consumption per bird was also in favour of the wheat pen, being 27·1 pounds as compared with 28·7 pounds for the bran and shorts pen. The mortality was negligible for both lots. Ground wheat was found to be a very satisfactory substitute for bran and shorts in a laying ration for winter egg production.

BARLEY VERSUS WHEAT IN A FATTENING RATION

This experiment was planned to determine the relative value of ground wheat and barley in a ration for fattening cockerels. Two uniform lots of fifteen birds each were placed on test in crates, receiving their feed daily at 7.30 a.m. and 5.30 p.m. The feed, made up into a thick batter, consisted of:

20 pounds ground grain
10 pounds shorts
10 pounds ground hulless oats
10 pounds beef scrap.

the ground grain being barley for one lot and wheat for the other.

The cockerels received only sufficient of the batter at a meal to satisfy their appetites. Over-feeding at a meal will result in stalling and a loss of weight. Feed troughs should be kept scrupulously clean between feeding periods. Mouldy or sour feed supplied to birds cooped in crates would be disastrous for making economical gains.

The barley and wheat rations were equally relished. During the fourteen days the birds were on test, the average gain in body weight per bird in both lots was close to 1 pound. The barley lot consumed 49·63 pounds of mash as compared with 46·75 pounds for the wheat lot. The colour and quality of fleshing and finish of the dressed birds were identical.

A RATION FOR BABY CHICKS

The following home made baby chick mash, which has promoted normal development with a low percentage mortality computed for the first six weeks following incubation, is recommended as a result of trials conducted at the Rosthern Station:—

10 pounds ground yellow corn or barley
10 pounds oat flour or sifted oat chop
10 pounds ground wheat
6 pounds shorts
4 pounds bran
6 pounds powdered milk
6 pounds beef scrap (60 per cent protein)
1 pound charcoal (fine)
1 pound bone meal (fine)
1 pound alfalfa blossom meal
1 pound cod liver oil
4 ounces common salt (fine).

Thorough mixing of all the ingredients is essential for best results and to obviate danger of pasting. To simplify the proper incorporation of the cod liver oil within the mash, it is suggested that the bran be worked in with the oil before preparing the mash.

For the chicks after six weeks, the following mash is used on the station:—

70 pounds ground wheat
46 pounds oat chop
46 pounds barley chop
10 pounds bran
10 pounds shorts
10 pounds beef scrap (60 per cent protein)
4 pounds charcoal (fine)
3 pounds bone meal (fine)
1 pound common salt (fine).

This mash was placed in hoppers where the chicks had free access to it. If after three months the chickens were developing too fast and sex characteristics were quite visible, utilizing only a small quantity of beef scrap, or eliminating it altogether, is advised.

Scratch grain for chicks from six weeks on, chickens on range, and fowl, was composed of 2 parts whole wheat, 1 part whole barley, and 1 part whole oats by weight.

After they were five weeks old the chicks were moved to a portable colony house, preferably on a clean grass range seeded to alfalfa, sweet clover, or a cereal mixture where there would be a rank growth of green feed, as green feed was found to be essential for normal development.

A recommended laying mash for winter egg production, which gave excellent response at this station by inducing from 50 to 75 per cent production in zero weather, consists of:—

84 pounds ground wheat
84 pounds ground barley
84 pounds ground oats
40 pounds bran
40 pounds shorts
40 pounds beef scrap (60 per cent protein)
6 pounds bone meal
6 pounds alfalfa meal
8 pounds charcoal (fine)
2 pounds common salt (fine)
6 pounds cod liver oil.

When skim-milk or buttermilk was available, the quantity of beef scrap was reduced to 20 pounds in the laying mash. The laying hens received 16 pounds of scratch grain per 100 birds per day, scattered in a deep straw litter morning and evening.

Green feeds add variety, minerals, and vitamins to the ration. Cabbage, mangels, leafy, well-cured alfalfa, or sweet clover were relished most by winter layers.

Grass sod placed in a box in the laying house makes an ideal dust bin for the birds.

Further details on any matters dealt with in this report are available on request, and correspondence with respect to any agricultural problems is cordially invited. A large stock of bulletins and other publications dealing with every phase of agriculture is available at the station for free distribution.

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