DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

BEE DIVISION

REPORT OF THE DOMINION APIARIST

C. B. GOODERHAM, B.S.A.

FOR THE YEAR 1924

The International Congress of Beekeepers in the Apiary of the Experimental Farm, Ste. Anne de la Pocatière, Que., Sept. 5, 1924.

Printed by authority of the Hon. W. R. Motherwell, Minister of Agriculture,
Ottawa, 1925

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OTTAWA: Printed by F. A. ACLAND, Printer to the King's Most Excellent Majesty, 1925.

DIVISION OF BEES

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FOR THE YEAR 1924

THE SEASON

The winter of 1923-24 was rather an unfavourable one for wintering bees. The mild, open weather of the autumn of 1923 continued until late in December and caused unusual activity among the bees long after they were fed and prepared for the winter. In many cases brood rearing was continued four or five weeks past the normal period. This late activity caused an extra heavy consumption of stores, which resulted in a shortage of food before the spring, and many colonies perished of starvation, while others were considerably reduced in strength. Five colonies on scales in the bee cellar at Ottawa showed that the average consumption during the winter was nearly double that of previous winters. For the most part colonies that wintered outside in packing cases suffered less than those wintered in cellars. The bees wintered outside were able to take good flights whenever the weather permitted, while those wintered inside, being confined to their hives, became restless. Of course this does not apply to properly constructed cellars, well insulated from outside temperatures and where the temperature could be held sufficiently low to keep the bees quiet. Unfortunately, however, the majority of cellars in which bees are wintered are unsuitable for that purpose, for the cellar temperature is usually affected by every decided change in outside temperature, and it is practically impossible to keep the temperature steady throughout the entire winter.

The spring was backward and very cool while the early sources of nectar were in bloom, which prevented the bees from taking full advantage of these early blossoms. Where colonies were already short of stores, the late, cool spring prevented rapid brood production which is so necessary at this period of the year in order to have the colonies up to maximum strength at the time the main flow commences. Heavy spring feeding was necessary in many places to avoid further starvation.

Weather conditions during the summer were also disappointing to bee-keepers over the greater part of Canada. In New Brunswick, Quebec and Ontario, wet, cool weather while the clovers were in bloom prevented the bees from working this main source of nectar to the full, with the result that the average yield for these provinces was very much reduced, in some cases as much as fifty per cent. In Manitoba, Saskatchewan and Alberta the very dry summer affected both flora and bees. The nectar-secreting flowers were not so abundant as usual and secreted very little nectar. The bees were unable to take full advantage of such flowers as were available because of much cool weather. In Prince Edward Island, Nova Scotia and British Columbia, fair to average crops were obtained.

The weather during the fall was fine and open, and considerable fall honey was gathered, especially in the eastern and central provinces. This late flow also stimulated brood production so that the colonies were in first

class condition for the winter as far as strength was concerned. The weather was also suitable for feeding and preparing for the winter, and on the whole, colonies were well prepared.

During the past season one small apiary was started at Indian Head, Sask., and bees are now kept at the following branch Farms:—Charlottetown, P.E.I.; Nappan, N.S.; Kentville, N.S.; Fredericton, N.B.; Ste. Anne de la Pocatière, Que.; Lennoxville, Que.; La Ferme, Que.; Kapuskasing, Ont.; Morden, Man.; Indian Head, Sask.; Scott, Sask.; Rosthern, Sask.; Lethbridge, Alberta; Lacombe, Alberta; Beaverlodge, Alberta; Fort Vermilion, Alberta; Invermere, B.C.; Summerland, B.C.; Agassiz, B.C.; Saanichton, B.C.; and the Central Experimental Farm, Ottawa. Out-apiaries are also being maintained at some of the Farms. Some of the apiaries listed are as yet small, but all are doing a useful work, not only in an experimental way, but in demonstrating the advantages of bee-keeping, modern equipment, and up-to-date methods of handling bees.

HONEY PRODUCTION AT OTTAWA AND OUT-APIARY

In spite of unfavourable weather conditions during the spring and summer, which not only prevented the colonies from building up as rapidly as could be desired, but kept the bees from working the main sources of nectar to the fullest capacity, a fair crop of honey was obtained. The bees were seen bringing in the first pollen on April 26. This was being gathered from willows, alders and maples which were blooming at the same time. Very little was gathered from these sources, however, as the bees were unable to leave the hives for several days at a time, and often then for only part of a day. The flow from dandelion and fruit bloom was again late, not starting until May 26, and then only lasting for a short time. This flow helped to stimulate brood production quite rapidly, but as the period between first and second flows was comparatively short the colonies did not build up early enough for the main flow.

The following table shows the time, length and density of the flow from dandelion and fruit bloom for the past eight years:—

HONEY FLOW FROM DANDELION AND FRUIT BLOOM

Year	Date flow started	Length of flow	Date flow ended	Highest yield in one day	No. of days during flow on which no gains were made
		days		pounds	days
1917	May 16	29	June 13	4¾	13
1918	" 17	15	May 31	3½	0
1919	" 24	13	June 5	2¾	0
1920	" 15	20	" 3	4½	2
1921	" 18	5	May 22	1	0
1922	" 18	11	" 29	3¼	4
1923	" 27	8	June 4	3½	0
1924	" 26	10	" 5	2½	2

The table shows that for the past two years the flow did not start until very late in the season, and that for the past four years the length of the flow was comparatively short, also that, with the exception of 1921, the highest daily gain was lower. No gains were registered on the scales from June 6 until June 18, a period of twelve days, one day less than in the previous year and thirteen less than in 1922. Alsike and white dutch clover were first seen in bloom on June 18, and bees were seen working them at the same time.

White sweet clover was first seen in bloom on July 11. The colonies on scales showed their first gain from these sources on June 18, when an average gain of 4 ounces was made. The peak of the flow was reached on July 2, when the highest individual gain made was 10 pounds 12 ounces, and the average for four colonies was 8 pounds 8 ounces.

The accompanying table shows the time, length and density of the clover flow for the past eight years:—

TIME AND LENGTH OF CLOVER HONEY FLOW

Year	Date flow started	Length of flow	Date flow ended	Highest average yield in one day		No. of days during flow on which no gains were made
		days		lbs.	oz.	days
1917	June 25	39	Aug. 2	9	4	4
1918	" 25	36	July 30	15	0	11
1919	" 14	42	" 25	13	4	7
1920	" 10	51	" 30	5	12	17
1921	" 5	44	" 18	11	4	1
1922	" 23	28	" 21	8	5	4
1923	" 17	57	Aug. 12	9	5	9
1924	" 18	42	July 29	8	8	8

The preceding table shows that the duration of the flow from clover was well up to the average, but with the exception of 1920 and 1922, the highest daily gain was lower than any of the previous years. Practically no gain was made after July 29, as there is no fall flow at Ottawa.

The total amount of honey extracted from 91 colonies at Ottawa was 7,673 pounds 12 ounces, or an average of 84 pounds 5 ounces per colony. Of the total crop 2,233 pounds were stored in comb built while the honey was being gathered. The out-apiary of eight colonies produced 1,113¼ pounds surplus, or an average of 139 pounds 2 ounces per colony.

INCREASE AT OTTAWA APIARY

One hundred and eight colonies were placed in winter quarters in the fall of 1923. Of these, six of the cellar-wintered colonies died during the winter and five others were so weak in the spring they had to be united to strong colonies. Three colonies were sent to one of the branch Farms in the spring, leaving a spring count of 94 colonies at both apiaries. The 94 colonies were increased to 114 colonies during the summer. Five colonies that wintered over with two queens were divided in the spring; other nuclei were formed during the summer in the course of queen breeding by placing capped and emerging brood in new hives and giving it a young laying queen, and a few colonies were formed by uniting the brood and bees from the mating boxes in the fall. The total increase, then, for the year was six colonies after replacing those lost the previous winter.

EXPERIMENT WITH VARIOUS MAKES OF FOUNDATION

The experiment with various makes and weights of foundation started in 1923 was continued. Thirteen samples of foundation were obtained from five different makers and used under the following conditions:—

1. In supers over non-swarming colonies during the early part of the clover flow when daily gains were light.
2. In supers over non-swarming colonies during the heavy part of the clover flow.

3. In supers over swarms.
4. In brood chambers of swarms.

In group one, the supers were given on June 24, when the average daily gain for five colonies was 4¼ pounds. In groups two, three, and four the foundation was given on July 4, when the average daily gain for four colonies was 8½ pounds.

Each sample of foundation was given a designating letter when fitted into the frames as follows:—

A.C.E.H.L.=Medium brood foundation from five different makers.

B.D.F.I.M.=Light brood foundation from five different makers.

J.=Medium brood foundation, vertically wired.

K.=Light brood foundation, vertically wired.

G.=Medium brood foundation, three-ply.

In all supers, nine sheets of foundation, three of each brand, were used and so placed that no advantage was given to any one sample.

Eight colonies of bees were used to work on the foundation. These were chosen at the beginning of the flow so as to get the colonies as near to equal strength and vigour as possible when the foundation was given. The colonies were examined every two or three days to note the progress made.

The season, although not so good as 1923, was a fair one for building new comb. The flow commenced on June 18 and continued for a period of forty-two days, on eight of which no gains were recorded.

The object of the experiment in group No. 1 was to ascertain if the bees favoured any particular make or weight of foundation and would work it better than any other. In groups two, three and four the object was to determine under which conditions the best combs would be built, and which foundation would give the best comb. The following table shows the time taken by the bees to begin and finish the combs in group No. 1.

FOUNDATION EXPERIMENT TABLE

Date foundation given—June 24..	A	B	C	D	E	F	G	H	I	J	K	L	M
Date first sheets started.....	June 26	June 26	June 26	June 26	June 30	June 30	June 26	June 26	June 26	June 26	June 26	June 26	June 26
Date last sheets started.....	June 30	June 26	June 26	June 30	July 3	July 5	June 30	June 30	July 3	July 5	July 3	July 3	June 26
Date first sheets finished.....	July 12	July 12	July 12	July 12	July 12	July 12	July 19	July 19	July 19	July 14	July 14	July 14	July 8
Date last sheets finished.....	N.F.	July 22	N.F.	July 25	July 19	July 14	N.F.	July 25	July 22	July 17	July 17	July 19	July 12

The above table shows that with the exception of E and F all samples of foundation were accepted and started within two days after it was given. It is true that in most cases all the sheets of any one sample were not started at the same time, but this was due to their position in the super. Some difference is shown in the time taken to finish the first combs. It will be seen that all sheets of M were finished in the least time, that A, B, C, D, E, F were the next to be finished, J, K and L were third, and G, H and I last. This difference in time of finishing, however, cannot be taken as indicating that the bees showed a preference for certain makes of foundation over others as far as finishing was concerned. In the test of 1923, "B" was the last make to be finished, while this year it was one of the first to be completed, and G, H, and I, the last to be finished this year were among the first in 1923. As the foun-

dation had to be drawn over different colonies, the difference in finishing may have been due to certain colonies being better suited for building combs than others.

The results of the past two years would indicate that as far as acceptance or building the comb goes, the bees did not show a preference for any one of the different brands of foundation used, provided that it was not injured through age or exposure to air for long periods.

The foundation given to group 2, 3 and 4 was not examined for time of acceptance or the finishing of combs. This experiment was to determine the quality of comb finished from the different weights of foundation, and under which condition the best combs would be drawn. The finished combs from group 1 were also examined for the same purpose.

In every case the best combs were finished in the supers. In these they were attached to all four sides of the frame. In the brood chambers, the only combs attached on all four sides of the frame were those built from vertically wired foundation.

As far as strength of combs was concerned, the medium brood foundation showed the least breakage after extracting. The light brood foundation, although accepted and finished as quickly as medium brood foundation, does not give equal strength to the finished combs.

Practically no difference could be seen between the different makes in the amount of stretched cells in the finished combs. A few enlarged cells in the row next to the top bar appeared in all makes; these were not due to sagging of any kind but to the way the foundation fits the top bar. Very little buckling of combs occurred this year. A, B, J, K, and M showed buckling to some extent, but was not very serious.

QUEEN BREEDING EXPERIMENT

The experimental work in queen breeding was continued at Ottawa and Kapuskasing. The queens were all reared in the apiary at Ottawa from queens of selected stock. A certain number of the queens were mated at Ottawa and others were sent to Kapuskasing, where isolated mating is certain, as no other bees are kept within twenty miles of this Station.

Four queens were chosen as queen mothers; one of these was used as a breeder in 1923, the others were selected daughters of queens used as breeders in 1921-22, and which had themselves shown prolificness and high production with little tendency to swarming for at least two successive years. The queens used for drone production were daughters of a queen that had been used as a queen mother two years in succession and whose mother had also been used as a breeder and chosen for the same characteristics as the queen mothers. Two of these queens were used at Kapuskasing and five at Ottawa. To encourage heavy drone production in these colonies, combs drawn on drone foundation were placed in the brood chamber early in the season. At Kapuskasing, drones from these queens were the only ones produced. At Ottawa, drone production was reduced as much as possible in all other colonies by removing all drone brood from them as it appeared, so as to flood the apiary with drones from selected parentage.

All the queen cells were started by either the swarm box and queenless colony methods and the cells incubated in finishing colonies, as described in the 1923 report. All the young queens were mated from nuclei in small mating boxes and not from full colonies. The queens sent to Kapuskasing were virgins not less than twenty-four hours old. As the queens became mated at this Station, they were removed from the mating boxes and sent to Ottawa or any of the branch Farms requiring queens. All full colonies at Kapuskasing were first re-queened from this stock.

During the season, 431 cells were finished, but only 347 of the resultant queens were used. Some of the queens did not emerge from the cells, while some of those that did emerge were rejected as being unfit. One hundred and sixty-three of the virgins were sent to Kapuskasing. Of these, 103 were success-

Part of the Queen Mating Apiary at Kapuskasing, Ont.

fully mated, the others being lost either in introduction to the mating boxes or during the mating flight. Of the 103 that were mated, twenty-three were used at Kapuskasing, four sent to Ottawa, seventy-four to branch Farms and two lost. At Ottawa, 184 virgins were introduced to mating boxes, but heavy losses occurred as only ninety-eight were successfully mated. Of these, sixty-one were used at Ottawa, twenty-seven sent to branch Farms, nineteen to private beekeepers and one destroyed.

CARNIOLANS VERSUS ITALIAN BEES

For the purpose of comparing these two races of bees for honey production, a number of Carniolan queens were obtained during the fall of 1923 and introduced to full colonies at Ottawa. As it was too late in the season to take them to the out-apiary, these colonies were wintered in the bee cellar. In the spring, only four of the colonies containing Carniolan queens were found alive. These were taken to the out-apiary at Britannia Heights to compare with four colonies of Italian bees already established there. All the bees were in ten-frame Langstroth hives. The apiary was visited once in every ten days, the colonies examined, and an estimate made of the number of combs covered with bees and the amount of brood present. As the season advanced and the colonies became stronger in bees, the brood nest was enlarged by giving a deep super without a queen excluder. At the first examination the Italian colonies were slightly stronger than the Carniolans both in bees and brood. This lead was maintained until after the commencement of the main honey flow, when the Carniolans then took the lead in brood production. During the season the Italian bees made no preparations for swarming, but two of the colonies superseded their queens. The Carniolans, although not so strong as the Italians, started to build queen cells at the commencement of the flow and continued until it finished. As high as forty-eight queen cells were

destroyed from one colony at a single examination. It was with great difficulty that these colonies were kept from swarming. One Carniolan queen was superseded during the flow.

The total and average crop obtained from each group is given in the accompanying table:—

Race of Bees	Number of Colonies in Group	Total Crop		Average Crop	
		lbs.	oz.	lbs.	oz.
Italians	4	765	4	191	5
Carniolans	4	348	0	87	0

It will be noted that the Italian colonies gave more than double the crop of the Carniolan colonies. This may be partly accounted for by the fact that the Italian bees were slightly stronger in the spring and that they had the advantage of spring protection by being left in their winter cases for several weeks after the Carniolans were taken from the cellar and received no protection. On the other hand the Carniolans wasted a great deal of their energy in making constant and excessive preparations for swarming when the flow was on, while the Italian bees devoted all their energy to nectar gathering.

Both groups are being wintered outside this year and under exactly the same conditions, so that a fairer test can be made next summer. No definite conclusions can be drawn from the past year's work.

RELATION OF BROOD AND BEES TO HONEY CROP

This project was started with the view of ascertaining the egg laying capacity of a prolific queen. Early in the spring two colonies of as nearly equal strength as possible were selected. One of the colonies was headed with a queen less than one year old, while the other was headed with a queen in her second year. Examinations of the colonies were made at intervals of nine and twelve days and measurements of the area occupied with eggs and brood made at each examination. From these measurements calculations were made as to the number of cells that were occupied at the time the measurement was taken. The brood counts were made as follows: Every comb was examined carefully for eggs or brood after the bees had been shaken from it. As each occupied comb was taken from the hive, a sheet of glass that fitted the inside of the frame was placed over the comb and an outline of the area occupied with eggs and brood was carefully traced on the glass. Any area of empty cells within the circle of brood was also traced on the glass. The outline on the glass passed over the outer ring of cells occupied and not over empty cells. A tracing was made of all areas occupied with brood within the hive. The glasses were then taken in and the sketches transferred to tracing paper and were then measured with a compensating planimeter, an instrument devised for measuring areas. The circle enclosing the brood was first measured and checked up. The areas of empty cells were next measured and deducted from the total contained within the circle, thus the actual number of square inches of comb occupied with eggs and brood was arrived at. By multiplying the number of square inches by twenty-five, the approximate number of worker cells to the square inch, the number of cells occupied was obtained. As it takes twenty-one days from the egg to the adult, all the eggs and brood within the hive at the time the measurement was taken were produced during the twenty-one days previous to the measurement. The number of occupied cells, then, if divided by twenty-one would give the average daily

production during the twenty-one days just prior to the time the measurement was taken. This method, however, does not give the actual production for any one particular day which may have fluctuated considerably during any one of the periods between counts.

Another interesting fact that was obtained from this experiment was the difference shown in the rate with which the colony headed with a one-year-old queen built up in comparison with the one headed with a two-year-old queen. It was found that the younger queen was far more prolific during the early part of the season when it is most important that the highest amount of brood be reared for the harvest. The older queen did not reach her peak of egg production until after the flow had started, therefore, this colony, instead of building up for the flow, built up on the flow, as shown in the table.

The accompanying table gives the dates on which the counts were made, the average daily egg production for the twenty-one days just prior to date on which the counts were made. The crop produced by the colonies is also shown.

TABLE OF DAILY EGG PRODUCTION

Colony No.	Age of queen	1st count made	Average daily egg production	2nd count made	Average daily egg production	3rd count made	Average daily egg production
111.....	1 year	June 11	2049	June 20	1992	July 2	1900
104.....	2 years	" 4	1264	" 24	1318	" 3	1520

Colony No.	4th count made	Average daily egg production	5th count made	Average daily egg production	6th count made	Average daily egg production	Crop
							lbs. oz.
111.....	July 14	1604	July 23	1282	Aug. 2	1170	111 0
104.....	" 15	1644	" 24	1831	" 11	1662	63 0

The preceding table shows that the average daily egg production for any one period of twenty-one days did not exceed 2049. It is possible that on certain days a higher or lower number than this was produced. It will also be noted the rate of egg production between the two queens varied considerably. The one-year-old queen was at her maximum production at the time the first counts were made, which were just prior to the main flow. This means that she was producing her maximum number of bees before the harvest commenced. The two-year-old queen, however, did not reach her maximum production until after the main flow commenced. In other words, this queen did not produce her force of bees in time for the flow, but produced them during the flow, when they would be of little or no value except in a locality where the main flow is late. The crop gathered by these two colonies demonstrates this fact quite clearly, as the colony which produced its bees for the harvest gathered almost double that of the colony which produced its bees on the harvest. The table also shows that both queens were dropping off in egg production after the main flow.

In conjunction with this experiment, a record of the crops obtained from ten colonies headed with one-year-old queens and ten colonies headed with two-year-old queens was kept for the past two years. The following table gives the crop obtained from each colony and the average for each of the two groups.

AGE OF QUEENS AND PRODUCTION

1923						1924					
One-year-old Queens			Two-Year-Old Queens			One-Year-old Queens			Two-year-old Queens		
Colony	Crop		Colony	Crop		Colony	Crop		Colony	Crop	
No.	lbs.	ozs.	No.	lbs.	ozs.	No.	lbs.	ozs.	No.	lbs.	ozs.
225	285	6	276	271	2	205	219	0	102	190	4
275	249	12	283	198	2	259	199	8	252	149	4
105	226	6	292	196	10	223	197	8	289	145	6
1	212	2	212	194	0	106	178	8	267	123	12
295	210	4	208	191	12	293	162	4	279	122	4
286	204	6	112	183	6	110	152	0	105	119	8
245	203	2	111	173	12	239	147	0	235	108	2
296	191	6	265	170	8	256	129	10	226	102	8
269	187	10	115	169	2	211	126	12	258	100	14
232	183	8	109	167	6	118	125	0	245	96	8
Totals	2153	14		1910	12		1637	2		1258	6
Averages	215	6		191	1		163	11		125	15

The preceding table shows that the average crop obtained from the colonies headed with young queens was larger than that from the colonies headed with two-year-old queens. In 1923, 243 pounds 2 ounces more honey were obtained from the ten colonies headed with one-year-old queens than from the same number of colonies containing two-year-old queens, while in 1924 the difference was 379 pounds 12 ounces in favour of the young queens. The results of this experiment, so far, indicate that colonies headed with queens less than one year old are more profitable than colonies headed with queens older than one year.

ALUMINUM COMBS

For the past four years tests have been made with metal combs in the brood chamber with very poor results. It was found that the bees did not take to the combs readily and refused to add the necessary wax to finish them ready for the brood even when the colonies were strong and contained young prolific queens. During the past season, five sets of aluminum combs were placed in supers over strong colonies during the honey flow. It was found that under these conditions the bees accepted them as readily as the wax combs and that the resultant combs were perfect. Next year the finished combs will be used in brood chambers to ascertain if bees will accept them for brood combs after being drawn out in supers.

SIZE OF HIVES

This experiment was continued, and in addition to the 10-frame Langstroth and Jumbo hives, the Modified Dadant hive was included in the test. As the bees had to be transferred to these new hives in the spring and to sheets of foundation instead of drawn combs, they received a severe check at the commencement of the season; therefore, the results obtained during the past year cannot be considered.

DISEASES

During the past season fewer samples of diseased brood or adults were received for diagnosis than the previous year. Thirty-eight samples of affected brood were received and examined. Of these, twenty-four were infected with American foul brood, six with European foul brood, three with sacbrood and five showed no signs of disease, but had evidently died either from chilling or starvation. Most of these samples were either received from foul brood inspec-

tors or sent in on their recommendations. All persons from whom samples were received were notified as to the nature of the disease present and methods of treatment. Only four samples of dead bees were received, but no indication of disease was found in any of them.

LEGISLATION RE IMPORTATION OF BEES

On March 11, 1924, an order was issued by the Deputy Minister of Agriculture reading as follows:—

"Under and by virtue of the authority conferred upon me by the provisions of the Order in Council of November 30th, 1909, containing regulations relating to Animals Quarantine, issued under authority of the Animal Contagious Diseases Act, Chap. 75, R.S.C. 1906, I, the undersigned, Joseph Hiram Grisdale, do hereby order that:—

'To prevent the further introduction of American foul brood and other diseases which affect the brood of bees, the importation into Canada of bees on combs or of used or second hand hives and bee supplies is prohibited.

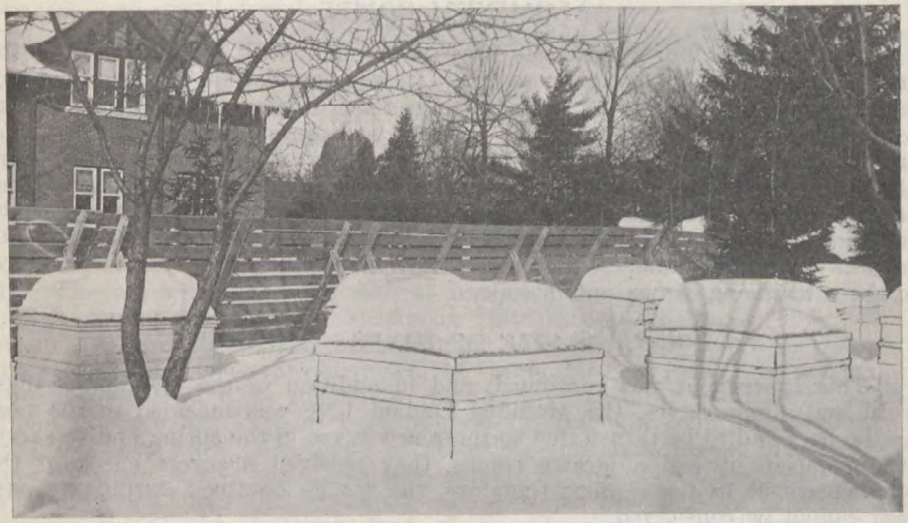
The importation of bees in combless packages is also prohibited, unless such packages are accompanied by a declaration signed by the shipper that the food supplied to the bees and carried in the package is free from disease.'

This Order shall come into effect on and after March 20th, 1924.

Dated at Ottawa this eleventh day of March, Nineteen twenty-four."

WINTERING AT OTTAWA 1923-24

One hundred and eight colonies were prepared for the winter of 1923-24, of these, ninety-three contained one queen and fifteen contained two queens. All colonies were of good strength on October 1. Feeding was commenced on September 29, and finished on October 5. Twenty-eight colonies were given



WINTERING AT OTTAWA

Bees snugly packed in four-colony cases. The snow affords further protection. Note windbreaks which are very important in outside wintering.

a shallow super of clover honey, four were given deep supers of clover honey, forty-five were given combs of clover honey in the brood chamber, fifteen were given sugar syrup two to one, eight were given honey syrup (80 per cent honey and 20 per cent water), while eight received a mixture of 50 per cent sugar syrup and 50 per cent honey syrup. Honey-pail feeders were used exclusively

for the feeding of the syrups as these are more easily handled than any other kind of feeders, and the bees do not have to leave the brood nest to reach the syrup.

WINTERING OUTSIDE

Fifty colonies were wintered outside, of these, forty-two contained one queen, and eight, two queens; the latter were in four Jumbo and four Langstroth hives. Eight of the singles were in Jumbo hives and thirty-four in Langstroth hives. The colonies were all weighed on October 3, then placed in their cases and packed on the bottom and all four sides. Feeding was done as rapidly as possible, and as soon as it was finished, the top packing was given. Forty of the colonies were in four-colony cases, six in two-colony cases, and four in single cases. All cases allowed for four inches of packing at the bottom and on all four sides, and six to eight inches on top.

The following table summarizes the average weights of colonies before feeding and the amount of stores fed:—

AVERAGE STRENGTH AND WEIGHT OF OUTDOOR-WINTERED COLONIES ON OCTOBER 3

Group	Stores	Average number of combs covered by bees	Average weight before feeding net wt.		Average amount fed	
			lbs.	oz.	lbs.	oz.
Single Langstroth	Shallow supers of clover honey	7·7	41	10	37	12
"	Deep supers of clover honey	8·5	53	10	29	8
"	Sugar syrup	8·2	63	4	20	4
"	Combs of honey in brood chamber	7·9	.....		.....	
Double Langstroth	Honey syrup	9·5	65	12	9	10
"	Fermented honey syrup	9·5	64	12	13	8
Single Jumbo	Shallow super of honey	8·5	63	4	38	6
"	Combs of honey in brood chamber	7·2	46	12	34	8
Double Jumbo	Honey syrup	7·2	61	12	18	0
"	Fermented honey syrup	7·0	62	0	18	0

The early part of the winter was very mild and the bees were flying freely as late as the last week in December. This late activity caused a heavier consumption of stores than usual. After the New Year it turned cold, and the bees rested well until April. At the first examination, April 24, all colonies were found alive and strong in bees with plenty of brood. The accompanying table gives average strength of colonies in each group at the first examination. The consumption during the winter is not given as the colonies were not unpacked until June 4, after the first flow was over.

CONDITIONS OF COLONIES IN SPRING

Group	Stores	Number of combs covered at first examination	Date of first examination	Average weight when unpacked June 4.	
				lb.	oz.
Single Langstroth	Shallow supers of clover honey	7·0	April 24	46	5
"	Deep supers of clover honey	7·5	" "	50	12
"	Sugar syrup	6·7	" "	46	0
"	Combs of honey in brood chamber	7·9	" "	..	..
Double Langstroth	Honey syrup	4·5	" "	38	4
"	Fermented honey syrup	6·0	" "	39	0
Single Jumbo	Shallow super of honey	6·5	" "	59	1
"	Combs of honey in brood chamber	6·7	" "	45	13
Double Jumbo	Honey syrup	4·5	" "	40	8
"	Fermented honey syrup	6·5	" "	49	6

It will be noted in the above table that all colonies contained a good force of bees at the first examination, even those that were wintered entirely on fermented honey. By comparing this table with the previous one it will also be noted that the strength in bees did not diminish much during the winter. and that the loss was least in those colonies wintered in a single brood chamber. None of the losses during the winter can be considered at all heavy.

CELLAR WINTERING

On November 8, fifty-eight colonies were taken into the cellar three days after a good flight. All colonies were in good condition at the time of bringing them in. Five of the colonies were kept on scales and the weight recorded each week. Owing to high temperatures in the cellar and restlessness among the bees, the average weekly consumption was rather high, 14.1 ounces as against 7.94 ounces during the previous year. The following table summarizes the average strength, weights before feeding and the amounts fed.

AVERAGE STRENGTH AND WEIGHTS OF CELLAR-WINTERED COLONIES ON OCTOBER 3

Group	Stores	Average number of combs covered by bees	Average weight before feeding		Average amount fed		Weight after feeding	
			lb.	oz.	lb.	oz.	lb.	oz.
Single Langstroth	Shallow supers of honey	8·4	47	6	37	11	84	8
"	Honey and sugar syrup	7·1	54	11	15	12	65	0
"	Sugar syrup	7·9	52	7	18	0	63	0
"	Combs of honey in brood chamber	7·5	46	3	22	7	68	8
Double Langstroth	Sugar syrup	9·0	59	0	18	0	65	0
"	Combs of honey in brood chamber	9·0	60	4	11	12	69	12
Single Jumbo	Combs of honey in brood chamber	8·0	55	8	18	11	68	8
Double Jumbo	Combs of honey in brood chamber	10·0	73	8	.....		77	10

The weather during the early part of the winter was very mild, and it was found impossible to keep the temperature of the bee cellar low enough for the bees. This resulted in extreme restlessness, and the bees were clustering outside of the hive entrances in large numbers until the New Year when it was found necessary to put a new ventilating shaft in the cellar. The latter part of the winter was very steady and the bees rested quietly.

The colonies were removed from the cellar on April 14, and were examined on April 16. Six colonies were found dead and five were so weak they had to be united. Eleven of the double colonies still contained two queens, three had each lost one queen, and one both queens. Of those living, six were used to save other colonies. The remaining colonies were in good condition as far as strength was concerned, but most of them were on the verge of starvation and had to be fed immediately. The following table gives the condition at first examination in the spring.

SPRING EXAMINATION

Group	Stores	Number of combs covered at first examination	Date of first examination	Average weight when removed from cellar		Average loss since feeding	
				lb.	oz.	lb.	oz.
Single Langstroth.	Shallow supers of honey	5·8	April 16	59	8	23	4
"	Honey and sugar syrup	4·0	" 16	39	11	25	5
"	Sugar syrup	6·5	" 16	42	10	21	0
"	Combs of honey in brood chamber	4·4	" 16	40	12	28	2
Double Langstroth	Sugar syrup	5·0	" 16	39	0	26	0
"	Combs of honey in brood chamber	5·75	" 16	39	12	30	0
Single Jumbo	Combs of honey in brood chamber	4·4	" 16	42	3	26	5
Double Jumbo	Combs of honey in brood chamber	3·8	" 16	43	8	34	3

The table shows that the consumption of stores in the cellar was exceptionally high during the winter and that considerable variation in consumption occurred in the different groups. If these tables are compared with those of the outdoor-wintered bees it will be seen that although both sets of colonies were of about equal strength in the fall, the cellar-wintered bees were on the average much weaker in the spring.

WINTERING 1924-25

One hundred and fourteen colonies were prepared for the winter of 1924-25. Of these, eighty-nine are being wintered outside in packing cases and twenty-five in the cellar. All colonies were weighed on September 22, and feeding commenced the following day, and was finished on September 29. Those wintered outside were first weighed, placed in their cases with bottom and side packing, and then fed. The top packing was given immediately after feeding. All colonies were strong in bees and contained ample stores when placed in winter quarters.

OUTSIDE-WINTERED COLONIES

Of the eighty-nine colonies wintered outside, eighty are in four-colony cases, with four inches of packing material on bottom and all four sides. The cases used are the same as have been in use for the past number of years. Six of the colonies are in double packing cases with the same amount of packing as in the four-colony cases. Three of the colonies are in single wintering cases. The bees outside are on the following stores: forty-nine given supers of honey, twenty-eight fed honey syrup, and twelve sugar syrup. The following table summarizes the average strength and weight of colonies before feeding and amount given:—

FEEDING COLONIES WINTERED OUT OF DOORS

Group	Stores	Average number of combs covered by bees	Average weight before feeding		weight after feeding	
			lb.	oz.	lb.	oz.
Single Langstroth	Shallow supers of clover honey	9·4	45	11	79	3
"	Honey syrup	9·4	47	13	65	7
"	Honey and sugar syrup	9·5	46	4	74	7
Double Langstroth	Honey syrup	8·6	48	8	77	10
Single Jumbo	Shallow supers of honey	9·5	49	0	80	10
"	Honey syrup	9·8	53	2	74	11
"	Honey and sugar syrup	9·75	58	8	77	8
Double Jumbo	Honey and sugar syrup	9·25	46	0	72	4
Dadant's	Shallow supers of honey	10·4	56	2	89	6
"	Honey syrup	10·6	61	10	78	6

CELLAR WINTERING

On November 17, 1924, twenty-five colonies were taken into the cellar five days after a good flight. All colonies were in good condition with regard to bees, but were light in stores, owing to heavy consumption during the cold weather between feeding and the time they were brought into the cellar. Five colonies are kept on scales and the records of weekly losses in weight recorded. The cellar temperatures have been kept steady at an average of about 43° F., and the bees appear to be wintering well.

The following table summarizes the average strength and weight before and after feeding.

CELLAR WINTERING—WINTER 1924-25

Group	Stores	Average strength	Weight before feeding		Amount		Weight after feeding	
			lb.	oz.	lb.	oz.	lb.	oz.
Single Langstroth	Sugar	9·4	50	5	19	2	65	11
Double Langstroth	"	7·6	47	10	22	8	62	0
Single Jumbo	"	8·0	60	8	9	0	64	0
Double Jumbo	"	8·0	59	10	18	0	69	0
Dadant's	"	10·0	58	11	13	8	65	5

Up to the time of writing the winter has been rather severe and very low temperatures have been recorded. It has, however, been very steady, and outside wintered bees have been confined to their hives for a long period and thus have been forced to rest more quietly than if warm weather had enticed them out.

EDUCATIONAL

During the year press articles on various phases of beekeeping have been issued from time to time. The Apiary Reminders that have been sent out to beekeepers during the past four years were continued, as the demand for them increased very largely. In 1924, 9,802 copies were sent out on request, as compared with 2,870 copies in 1923. Addresses were given at the annual conventions of the Ontario, Quebec and Manitoba Beekeepers' Association, and at several other beekeepers' meetings and field days. Lectures were also given at beekeeping short courses held at Macdonald College, Que., Manitoba Agricultural College, Winnipeg, Man., and at the Irrigation Short Course at Lethbridge, Alta.

The apiaries at the various branch Farms were also visited for the purpose of supervising the experimental work that is being done at them. At two of these Farms, field days were held at the time of these visits, and demonstrations and talks were given on the handling and care of bees. Many private beekeepers were also visited and assistance given.

The Seventh International Congress of Beekeepers' was held on September 1 to 4 at Quebec, under the auspices of the Quebec Beekeepers' Association. Delegates from France, Belgium, Italy, Switzerland, the United States and from many of the provinces of Canada were present. The Congress was divided into two sections, English and French. About one hundred and fifty persons were present at the French sessions and about fifty at the English sessions. Many valuable papers were read and discussed at these meetings. During the Congress, the members and delegates made a visit to the Experimental Farm at Ste Anne de la Pocatière, where demonstrations and addresses were given regarding the object and work of the Experimental Apiaries.