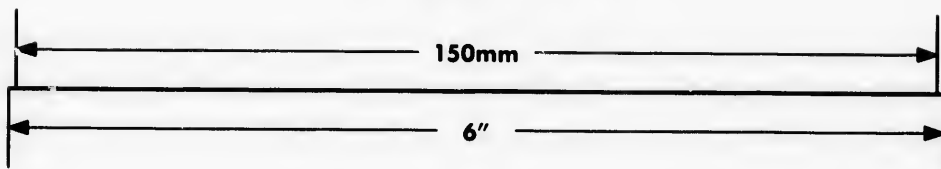
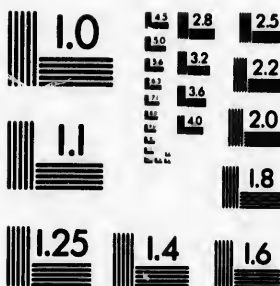
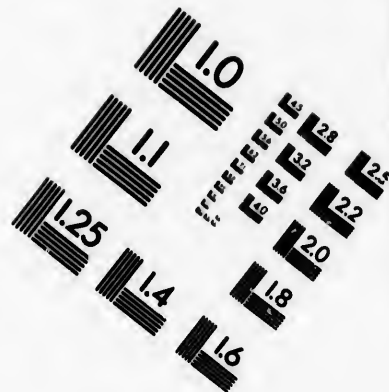
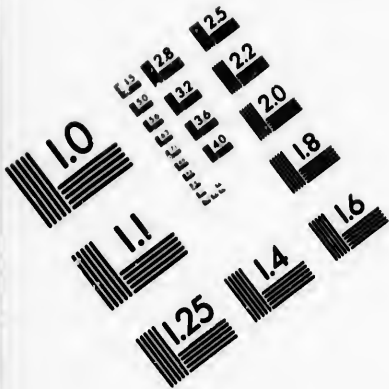


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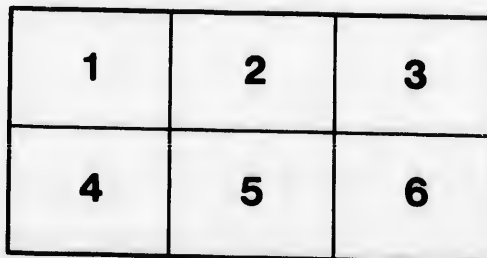
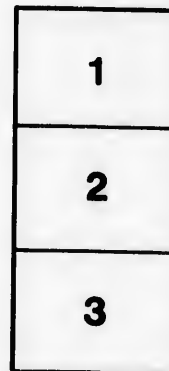
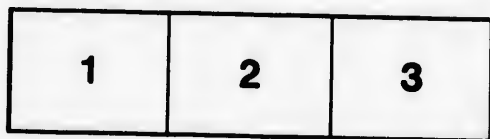
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BULLETIN 104

DECEMBER, 1896.

Ontario Agricultural College and Experimental Farm

RATIONS FOR DAIRY COWS

AND

OTHER MATTERS OF INTEREST TO DAIRYMEN.

By G. E. DAY, B.S.A., AGRICULTURIST.

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BULLETIN 104.

RATIONS FOR DAIRY COWS

AND

OTHER MATTERS OF INTEREST TO DAIRYMEN.

BY G. E. DAY, B.S.A.

At the annual meeting of the Ontario Agricultural and Experimental Union, held in December, 1895, a committee was appointed to collect information of interest to the stock breeders of the Province. The committee decided to make an attempt to collect information of interest to dairymen, and the method employed was as follows: Reply post cards were sent to the proprietors and managers of cheese factories and creameries in Ontario, and to secretaries of Farmer's Institutes, asking for the names of the most successful dairymen in their districts. In this manner a large number of names were obtained, and a circular letter, accompanied by a form containing a number of questions, was sent to each of the gentlemen whose names had been procured. Altogether, 363 forms were sent out, of which 170 were returned with the questions more or less fully answered. Replies were received from thirty-six counties, extending from Essex in the west, to Glengarry in the east, so that the different districts of the Province are well represented.

As director of the Committee, I have taken the liberty of arranging the results of inquiries in bulletin form, together with matter, compiled from various sources relating to the principles of feeding, composition of fodders, etc. This bulletin is not designed for scientific readers, but every effort has been made to simplify the subject of scientific feeding, and many details which might tend to confuse the average reader have been purposely omitted.

The thanks of the committee and of the Experimental Union are due to those gentlemen who so courteously responded to the request for information, the nature of which will be obtained from a perusal of this bulletin.

Length of Time Cows Remain Dry. A wide variation existed in this particular, the shortest time reported being 10 days, while the average for all replies was 57 days. By far the largest number lay between 6 and 12 weeks, and 8 weeks occurred in the reports more than twice as often as any other one time.

Dehorning. Sixty eight out of the 170 dairymen report cows dehorned ; and, with very few exceptions, they express themselves satisfied with the result. One man states that the cows do not sell so readily, owing to difficulty in determining the age ; another partially regrets dehorning pure-breds, fearing that it will operate against them in the show ring, while a third states that his dehorned cows bunt each other, sometimes causing abortion. On the other hand, several whose cows are not dehorned, express approval of the practice, while others condemn it as cruel, unsightly, unnecessary, etc. The fear that it would interfere with success in exhibiting has deterred a considerable number from dehorning pure-breds. Only four report that they are dehorning calves, and the following two methods are recommended as very effective and satisfactory :

1st. When the calf is from four to six days old, the hair is clipped from around the horn, and some butter of antimony is rubbed on the budding horn, with a thin piece of wood. It is then rubbed over again with the same quantity of oil of vitriol (sulphuric acid). Less than a drop of each substance will do the work.

2nd. When the calf is three or four days old, the skin where the horn grows is scarified, and a little of Gillett's lye applied to the scar.

In this connection it may be noted that caustic potash is frequently used instead of the substance mentioned above.

Horn Fly. Out of 170 replies, 142 reported horn flies troublesome, 23 reported them not very troublesome, and 5 reported them not troublesome. Those who reported the fly not troublesome represented the counties of Essex, York, Addington and Leeds ; while replies of "not very troublesome" came from the counties of Kent, Elgin, Middlesex, Perth, Bruce, York, Dufferin, Victoria, Northumberland, Hastings, Addington, Stormont and Dundas. From some of these counties, however, reports were received of a directly opposite character, and hence this information is rather unsatisfactory.

The remedies employed for the horn fly are exceedingly varied, and range all the way from kerosene emulsion down to applying tar to the horns, and even dehorning, the advocates of the latter evidently forgetting that when the fly rests upon a cow's horn it occasions her less annoyance than at any other time. For convenience sake, the remedies have been arranged under four heads, and the number of persons who have tried the different classes of remedies, are as follows :

Twenty-two employed different kinds of oil and grease with carbolic acid, 19 tried kerosene emulsion, 6 experimented with the Guthrie horn fly trap, and 40 resorted to various other remedies.

Opinions regarding the merits of different remedies are anything but unanimous, one man commending and another expressing unqualified condemnation of the same remedy. The main source of dissatisfaction seems to be the frequency of application necessary to secure good results. The following conclusions have been deduced from the replies received :

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Oil and carbolic acid mixed in proportion of one ounce crude carbolic acid to one quart oil, is a very effective repellent, but requires to be applied all over the cow's body every week. The kinds of oil used include fish oil, sturgeon oil, tanner's oil, and linseed oil, besides whey grease and almost any other kind of grease or oil. An objection to using strong smelling repellants is urged by some on the ground that there is danger that the odors may taint the milk where cows are milked in the stable.

Kerosene emulsion does very well for a short time, but requires to be applied every day; and for this reason it is very generally condemned.

The Guthrie horn fly trap is both commended and condemned by those who have used it, the favorable reports rather outweighing the unfavorable. Its most effective use would seem to be at the stable door, to clear the cows of flies as they enter the stable.

Among the more important of other remedies mentioned occur the following:

One pint coal oil, 1 quart soft soap, 1 ounce carbolic acid, 3 gallons soft water, applied twice a week.

Whey grease, applied twice a week.

Oil of tar and raw linseed oil, applied once a week.

Lard and pine tar, applied twice a week.

Equal parts fish oil and coal oil, with a little coon oil.

"Mexican Fly Exterminator," "Horn-fly Ointment," and "mixtures obtained from drug stores," receive but scant commendation.

Of the various repellants, probably the first mentioned, viz., oil or grease and carbolic acid, is the simplest and most effective, though it is not without objectionable features. Keeping the cows in the stable during the heat of the day is highly recommended by several prominent dairymen; and no doubt this method, coupled with the use of the Guthrie fly traps, could be made very effective.

Summer Feeding. Only one reply stated that complete soiling was practised, but 140 out of the 170 stated that the pasture was supplemented by some kind of green fodders, while 53 stated that meal was fed, either throughout or during some part of the summer.

The following figures represent the number of times that the various supplementary fodders occurred in the reports:

Green corn	129	Ensilage	5
Green oats and peas	62	Green alfalfa	4
Green rye	10	Green millet	2
Green clover	10	Green buckwheat	3
Green oats and tares	7	Green tares	2

A glance at these figures will show that out of 140 who used green fodders only 11 did not use corn. The most common combination consisted of oats and peas, or oats and tares for summer feeding, with corn for autumn. A large number used corn alone, and, hence did not commence feeding until late in the season,

while the early soiling crops, rye, alfalfa and clover, were comparatively little used. Those who are in need of an early soiling crop, especially for light or gravelly soils, would do well to give alfalfa a trial.

Winter Feeding. Some difficulty has been experienced in obtaining accurate information regarding winter rations, as the majority of farmers do not weigh feed. From the 170 replies, 75 rations have been selected, and are given below. A larger number might have been given, but those selected illustrate fairly well the principal characteristics of Ontario rations, and it has not been deemed advisable to make the list any longer. The weight of the cows has been stated wherever this information has been furnished in the report. It was also thought advisable to include the summer ration, and to state, when possible, the results obtained from the different systems of feeding. It is only fair to say, however, that many of the records do not represent the actual returns from the cows, since no account has been kept of milk, butter and cream consumed by the family, besides milk fed to calves and hogs. The rations given below are not intended as models, but they are worth reading carefully.

Some Ontario rations for dairy cows.

1. PERTH Co. Shorthorns, Jerseys, and Jersey grades. Average weight of cows, 1,000 lbs.

Record: Sold 6,200 lbs. butter from 22 cows.

Winter Ration: 6 lbs. bran, 3 lbs. oil meal, 50 lbs. ensilage, 4 lbs. timothy hay, 4 lbs. oat and vetch hay.

Summer ration: 6 lbs. bran to best cows, fall rye, clover, oats and vetches, and green corn, with pasture,

2. NORTHUMBERLAND Co. Ayrshires. Average weight of cows 1,000 lbs.

Record: 64,734 lbs. milk, and 700 lbs. butter from 11 cows.

Winter ration: 4 lbs. bran, 2 lbs. peas, 2 lbs. oats, 1 lb. oil meal, 24 lbs. timothy and clover hay, and 10 lbs. roots.

Summer ration: 2 to 5 lbs. peas, oats, and bran, equal parts by weight, green peas and oats, and green corn, with pasture.

3. OXFORD Co. Grade Shorthorns and Jerseys. Average weight of cows 900 lbs.

Record: 110,316 lbs. milk, averaging 39 per cent. fat, from 20 cows.

Winter ration: 4 lbs. oats, 1 lb. oil meal, 40 lbs. ensilage, 30 lbs. roots, with cut hay and straw.

Summer ration: Green oats and peas, with pasture.

4. DUNDAS Co. Grade, Ayrshires. Average weight of cows 1,000 lbs.

Record: 30 cows averaged \$45 each.

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Winter ration : 8 lbs. bran, 6 lbs. corn and cob meal, 6 lbs. mixed peas, oats, and barley, 20 lbs. corn fodder, 20 lbs. mangels, and all the hay and straw they will eat.

Summer ration : Green peas and oats, and green corn, with pasture.

5 PEEL Co. Jerseys. Average weight of cows, 800 lbs.

Record : Average of 325 lbs. butter per cow.

Winter Ration : 9 lbs. bran, 1 lb. peas, 24 lbs. ensilage, 6 lbs. hay, 10 lbs. straw, and 20 lbs. roots.

Summer Ration : Small quantity of bran and oats, green oats and peas, and green corn, with pasture.

6. GLENGARRY Co. Grade natives. Average weight of cows, 950 lbs.

Record : 70 cows, average from 5,000 to 6,000 lbs. milk each.

Winter Ration : 2½ lbs. cotton seed meal, 2½ lbs. linseed, 50 to 60 lbs. ensilage, and 4 to 5 lbs. hay. Sometimes meal ration is, 2 lbs. cotton seed meal, and 4 lbs. shorts.

Summer Ration : Pasture, with green corn in October and November.

7. LANARK Co. Ayrshires. Average weight of cows, 900 lbs.

Record : Cows average \$56 per head for butter sold.

Winter Ration : 8 lbs. mixed oats, peas, barley, and bran, in proportion of 6, 3, 3, and 1, 50 lbs. ensilage, 10 lbs. mixed clover and "beaver-meadow" hay, with an occasional feed of straw and roots.

Summer Ration : Pasture.

8. YORK Co. Jerseys. Average weight of cows, 750 lbs.

Record : \$97.60 per cow for cream sold in Toronto.

Winter Ration : 9 lbs. oats, 60 lbs. ensilage, 6 lbs. hay, with what straw they will eat.

Summer Ration : 2 lbs. oatmeal, green corn, with pasture.

9. OXFORD Co. Holsteins. Average weight of cows, 1,200 to 1,300 lbs.

Records : Fresh cows, 50 to 85 lbs. milk daily; two year old heifers, 35 to 45 lbs. milk daily. All below this go to butcher.

Winter Ration : 6 lbs. oats, 2 lbs. oil meal, 3 lbs. bran, 35 lbs. ensilage, 10 lbs. timothy and clover hay, 8 lbs. oat and barley straw, 30 lbs. mangels and turnips. Bran is scalded and fed as slop.

Summer Ration : 3 to 6 lbs. oats and bran when pasture is poor, green peas and oats, green corn, white turnips, and sugar beets, with pasture.

10. STORMONT Co. Grade Ayrshires. Average weight of cows, 900 lbs.

Records : 40 cows averaged \$50 per head for milk sold in Montreal.

Winter Ration : 2 lbs. linseed meal, 5 lbs. bran, 3 lbs. mixed peas, oats, and corn, 25 lbs. clover hay, 10 lbs. corn fodder, and 20 lbs. mangels or carrots.

Summer Ration : Green peas and oats, and green corn, with pasture.

11. MIDDLESEX Co. Grade Holsteins. Average weight of cows, 1,100 lbs.

Record : 24 cows averaged \$46 per head for cheese and milk.

Winter Ration : 8 lbs. oats, 40 lbs. ensilage and about 10 lbs. straw.

Summer Ration : 2 lbs. bran, green peas and oats, with pasture.

12. LEEDS Co. Holsteins. Average weight of cows, 1,000 lbs.

Records of different individuals. 7,400 lbs. milk in seven months, 9,020 lbs. in seven months, 5,620 lbs. in seven months, 4,300 lbs. in four months.

Winter Ration : 5 to 6 lbs. bran, 2 to 3 lbs. corn meal, 40 to 50 lbs. ensilage, 10 lbs. corn fodder, 5 lbs. timothy hay. Sometimes same quantity pea meal substituted for corn meal.

Summer Ration : 5 lbs. bran (when pasture is scarce), green corn, with pasture.

13. OXFORD Co. Holsteins. Average weight of cows, 1,200 lbs.

Record : From 10,000 to 15,000 lbs. milk per cow. Have averaged \$71 per cow for 6½ months at cheese factory.

Winter Ration : 8 lbs. oats, 2 lbs. bran, 40 lbs. ensilage, 10 lbs. straw, and 6 lbs. hay. Sometimes a little oil meal is fed, but meal ration never exceeds 10 lbs.

Summer Ration : Green rye, oats and peas, and millet, with pasture.

14. YORK Co. Jerseys. Average weight of cows, 800 lbs.

Records of individuals : Butter made in seven days, 26 lbs. 1 oz., 22 lbs. 4 oz., 18 lbs. 9 oz., 15 lbs. 6 oz.

Winter Ration : 12 lbs. equal parts oats, bran, and corn meal, 1 lb. oil meal, 20 lbs. corn fodder, 5 lbs. hay, 24 lbs. roots, with straw *ad lib*.

Summer Ration : 1 lb. oil meal, 2 lbs. peas, 2 lbs. bran (with 4 lbs. oat meal added in fall), clover, green peas and oats, and green corn, with pasture.

15. BRANT Co. Holsteins. Average weight of cows, 1,200 lbs.

Record : 10,000 lbs. milk per cow, averaging 3.75% fat.

Winter Ration : 4 lbs. oats, 3 lbs. peas, 3 lbs. bran, 40 lbs. ensilage, 5 lbs. hay, and 10 lbs. straw. Sometimes 1 or 2 lbs. oil meal.

Summer Ration : 3 lbs. oats, 2 lbs. bran (when pasture is dry), and green corn.

16. WENTWORTH Co. Ayrshires and Jersey grades. Average weight of cows, 800 lbs.

Record : Cows average \$55 per head.

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Winter Ration: 2 lbs. bran, $\frac{1}{2}$ lb. oats, $\frac{1}{2}$ lb. barley, $\frac{2}{3}$ lb. peas, $\frac{1}{2}$ lb. oil cake, 25 lbs. ensilage, 6 lbs. mangels, 1 oat sheaf between two cows, with straw *ad lib*.

Summer Ration: Green corn with pasture, and sometimes $1\frac{1}{2}$ lbs. bran and oil meal.

17. DUNDAS Co. Jerseys. Average weight of cows, 850 lbs.

Record: \$55 per cow for butter sold.

Winter Ration: 8 lbs. bran, $1\frac{1}{2}$ lbs. oil meal, 40 lbs. ensilage, and 7 to 10 lbs. hay.

Summer Ration: 5 to 6 lbs. bran (when pasture is dry), green oats, peas and tares, with pasture.

18. YORK Co. Jerseys. Average weight of cows, 900 lbs.

Record: \$118 per cow for cream sold in Toronto.

Winter Ration: 5 lbs. corn meal, 5 lbs. oats, 5 lbs. oil meal, 20 lbs. corn fodder, 5 lbs. roots, 5 lbs. hay, and about 5 lbs. straw.

Summer Ration: Green corn with pasture.

19. NORTHUMBERLAND Co. Grade Ayrshires.

Record: 78 500 lbs. milk and 1,200 lbs. butter from 25 cows, including two year old heifers.

Winter Ration: $3\frac{1}{2}$ lbs. shorts, $1\frac{1}{2}$ lbs. oil meal, 30 lbs. ensilage, 4 lbs. hay, 5 lbs. straw.

Summer Ration: Green clover, green oats and peas, green corn, and white turnips, with pasture.

20. STORMONT Co. Ayrshires. Average weight of cows, 800 lbs.

Record: \$35 per cow for milk and butter.

Winter Ration: 2 lbs. oats, 2 lbs. peas, 2 lbs. shorts or bran, 2 lbs. oil meal, 12 lbs. clover hay, 1 peck of roots, with straw *ad lib*.

Summer Ration: Green oats and tares, with pasture.

21. FRONTENAC Co. Grade Shorthorns. Average weight of cows, 900 lbs.

Record: 15 cows average over \$40 per head.

Winter Ration: 7 lbs. mixed oats, peas, goose wheat, and bran, in following proportions by measure: 3, 1, $\frac{1}{2}$, $2\frac{1}{2}$; 40 lbs. ensilage, 5 lbs. clover hay, with straw *ad lib*.

Summer Ration: Green peas and oats, and green corn, with pasture.

22. HASTINGS Co. Ayrshires and Ayrshire grades. Average weight of cows, 1,000 lbs.

Record: Total returns from herd of 20 animals, \$696.

Winter Ration: 8 lbs. of corn, oats, and bran, mixed in proportion of 10, 4 and 5, by weight, $\frac{1}{2}$ bushel of roots, $\frac{1}{2}$ bushel corn fodder, some oat hay, with straw *ad lib.*

Summer Ration: $1\frac{1}{2}$ lbs. bran, green rye, clover, and oats, with pasture.

23. OXFORD Co. Ayrshires. Average weight of cows, 950 lbs.

Record: Cows average 36 to 40 lbs. milk per day.

Winter Ration: 3 lbs. oats, 3 lbs. barley, 3 lbs. peas, 8 lbs. corn fodder, 8 lbs. chaff, 5 lbs. straw, and 20 lbs. roots.

Summer Ration: Pasture.

24. BRANT Co. Holsteins. Average weight of cows, 1,200 lbs.

Winter Ration: 6 lbs. peas, 40 lbs. ensilage, 15 lbs. corn fodder, 15 lbs. chaff, 10 lbs. hay, 60 lbs. roots, with straw *ad lib.*

Summer Ration: Green peas and oats, Lucerne, and corn, with pasture.

25. NORTHUMBERLAND Co. Holsteins. Average weight of cows, 1,100.

Record: 1,100 lbs. butter in 4 months, from 10 cows.

Winter Ration: 4 lbs. corn meal, 4 lbs. bran, 1 lb. barley, 10 lbs. hay, and 20 lbs. straw.

Summer Ration: Green peas and oats, corn, and turnips, with pasture. Sometimes 4 lbs. bran.

26. WELLAND Co. Grade Shorthorns. Average weight of cows, 1,100 lbs.

Record: 20 cows averaged 250 lbs. butter per head.

Winter Ration: 6 lbs. corn meal, 3 lbs. bran, 5 lbs. hay, with corn fodder *ad lib.* Corn fodder is steeped in hot water.

Summer Ration: Green corn, with pasture.

27. WELLINGTON Co. Grade Shorthorns. Average weight of cows, 1,050 lbs.

Record: \$80 per cow for milk sold in city.

Winter Ration: 5 lbs. bran, 45 lbs. roots, 50 lbs. corn fodder, and chaff and straw *ad lib.*

Summer Ration: Green oats and peas, and corn, with pasture. Sometimes 3 lbs. bran.

28. HALDIMAND Co. Grade Shorthorns. Average weight of cows, 1,050 lbs.

Record: 34 cows, including 14 heifers, averaged \$42 each.

Winter Ration: 6 lbs. equal parts oats, peas, bran, and oil meal, 35 to 40 lbs. ensilage, 10 lbs. roots, with chaff and straw *ad lib.*

Summer Ration: Ensilage and green corn, with pasture. Sometimes bran and oat meal.

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29. ELGIN Co. Grade Shorthorns. Average weight of cows, 1,100 lbs.
Record : \$400 from 12 cows, for cheese and butter.
Winter Ration : 9 lbs. oats, 3 lbs. peas, 20 lbs. hay, 60 lbs. roots, with straw *ad lib.*
Summer Ration : Pasture.
30. BRUCE Co. Grade Ayrshires, Holsteins, and natives. Average weight of cows, 900 lbs.
Record : \$372 from 12 cows, for cheese and butter.
Winter Ration : 6 lbs. oats, 2 lbs. shorts, 1 lb. bran, 12 lbs. corn fodder, 15 lbs. straw, and 25 lbs. roots.
Summer Ration : Alfalfa, green peas and oats, and corn, together with some cats, bran, and shorts.
31. NORTHUMBERLAND Co. Ayrshire and Ayrshire grades. Average weight of cows, 800 to 1,200 lbs.
Record : 24 cows, including two year old heifers, average 7,000 lbs. milk each.
Winter Ration : 5 lbs. bran, 5 lbs. peas, 35 to 45 lbs. ensilage, 10 lbs. timothy hay. Ration is regulated to suit capacity of cows.
Summer Ration : 5 to 6 lbs. bran, ensilage, green peas and oats, and corn, with pasture.
32. BRUCE Co. Shorthorns and grades. Average weight of cows, 1,150 lbs.
Record : 12 cows, average 6,030 lbs. milk each.
Winter Ration : 3½ lbs. oats, 3½ lbs. peas, 24 lbs. ensilage, 4 lbs. hay, 10 lbs. straw, 25 lbs. roots.
Summer Ration : Green corn, with pasture.
33. BRUCE Co. Ayrshire and Shorthorn grades. Average weight of cows, 1,000 lbs.
Record : \$395 from 10 cows, for cheese and butter sold.
Winter Ration : 10 lbs. mixed oats and corn in proportion of 3 to 1, 10 lbs. chaff, 5 lbs. hay, 15 lbs. potatoes, with straw *ad lib.* Would rather feed oats and peas, in proportion of 3 to 2.
Summer Ration : 3 lbs. oat meal, green oats and peas, oats and tares, corn, and white turnips, with pasture.
34. YORK Co. Mixed breeds. Average weight of cows, 1,000 to 1,200 lbs.
Record : \$1,009.35 from 12 cows, for milk and butter sent to Toronto.
Winter Ration : 15 lbs. equal parts oats and peas, ½ lb. flax seed, 35 lbs. roots, some corn fodder and hay, with chaff and straw *ad lib.*
Summer Ration : Green corn, with pasture. Meal fed all summer, according to pasture.

35. OXFORD Co. Grade Shorthorns, Holsteins and Jerseys.
Record : 35 cows averaged \$35 per head for cheese and butter. (Lower than formerly.)
Winter Ration : 4 lbs. bran, 1 lb. oil meal, 40 to 50 lbs. ensilage, 4 to 5 lbs. straw. Some potatoes and clover hay fed in spring.
Summer Ration : Ensilage and green corn, with pasture.
36. DUNDAS Co. Grade Jerseys and Holsteins. Average weight of cows, 900 lbs.
Record : \$800.75 from 23 cows. Cream separated and sent to Montreal to be made into butter for city trade.
Winter Ration : 5 lbs. bran, 2 lbs. oil meal, 50 lbs. ensilage, 10 lbs. hay.
Summer Ration : Green peas and oats, with pasture.
37. LEEDS Co. Guernseys and grades. Average weight of cows, 1,000 lbs.
Record : Cows average 6,000 lbs. milk per head.
Winter Ration : 9 lbs. bran and shorts as it comes from mill, 3 lbs. corn meal, 10 lbs. clover hay, and 45 lbs. roots.
Summer Ration : Pasture. Intend to feed meal all summer, in future.
38. DURHAM Co. Grades. Average weight of cows, 800 lbs.
Record : \$1,500 from 20 cows, for bottled milk and butter.
Winter Ration : 8 lbs. equal parts bran and oats, 40 lbs. ensilage, 6 lbs. hay, and 6 lbs. roots.
Summer Ration : 3 to 5 lbs. equal parts bran and oats, green oats and peas, with pasture.
39. HASTINGS Co. Grade Shorthorns. Average weight of cows, 1,000 lbs.
Record : 16 cows averaged \$54 per head.
Winter ration : 4 lbs. peas, 4 lbs. bran, 2 lbs. oil meal, 40 lbs. ensilage, 5 lbs. hay, and 5 lbs. straw.
Summer ration : Green peas and oats, and green corn, with pasture. Sometimes bran is fed.
40. GLENGARRY Co. Ayrshire.
Record : \$150 a month from 40 cows, for cream sent to Montreal.
Winter ration : 3 lbs. flaxseed, 3 lbs. shorts, some roots, with hay *ad lib*.
Summer ration : Green corn, with pasture.
41. ADDINGTON Co. Various grades. Average weight of cows, 900 lbs.
Record : \$999 from 33 cows.
Winter ration : 7 lbs. oats and corn and oob meal, mixed in proportion of 1 to 3, 50 lbs. ensilage, 5 lbs. corn fodder, 10 lbs. hay, 5 lbs. chaff, and 10 lbs. straw.
Summer ration : Green corn, with pasture.

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42. VICTORIA Co. Grade Aberleens-Angus. Average weight of cows, 1,000 lbs.

Record: Cows average 7 to 8 lbs. butter per week, per head.

Winter ration: 3 lbs. oats, 1 lb. buckwheat, 1 lb. peas or barley, 10 lbs. hay, 1 bushel corn fodder, 20 lbs. roots, with straw *ad lib.*

Summer ration: Green peas and oats, and corn, with pasture.

43. MIDDLESEX Co. Grade Natives. Average weight of cows, 1,000 lbs.

Records: In 1893, \$50, in 1894, \$48, in 1895, \$40 per cow, for cheese and butter.

Winter ration: 8 quarts oats, with corn fodder, hay, turnips, and mangels.

Summer ration: Green corn and turnips, with pasture, and 8 quarts oatmeal during May.

44. GRENVILLE Co. Natives. Average weight of cows, 1,000 lbs.

Record: \$430 09 from 12 cows, for butter sold.

Winter ration: 2 lbs. bran, 8 lbs. corn refuse from starch factory, 40 lbs. ensilage, 8 lbs. clover hay, 8 lbs. oat straw, and 20 lbs. roots.

Summer ration: Green corn, with pasture.

45. HASTINGS Co. Ayrshires, Jerseys, Holsteins, and grades of each.

Records: Cows must test 3 per cent. butter fat, and give 6,000 lbs. milk. Best daily flow of milk from cow, 71 lbs.; weekly, 474½ lbs. Best daily flow of milk from yearling, 32¾ lbs.; weekly, 216½ lbs.

Winter ration: Not more than 10 lbs. meal per cow, unless she gives over 50 lbs. milk per day, and, in no case, more than 15 lbs. meal. Meal preferred; oil meal, cracked oats, cottonseed meal, bran, and malt combings, mixed in proportions, 1/10, 1/5, 1/5, 2/5, and 1/10, but good results obtained without cottonseed meal and malt combings. Also feed ensilage and straw, with 6 to 9 lbs. hay.

Summer ration: Cows fed in stable. Green rye, green oats and peas, alfalfa, green corn, and 1 to 2 lbs. bran.

46. GREY Co. Grade Shorthorns. Average weight of cows, 1,100 lbs.

Record: \$36.50 per cow, for butter sold.

Winter ration: 2 lbs. peas, 2 lbs. oats, 2 lbs. wheat, 2 lbs. bran, 30 to 40 lbs. ensilage, 5 lbs. hay, 15 lbs. turnips, with chaff and straw *ad lib.* Heavier meal ration to some cows.

Summer ration: Green oats and peas, green corn, with pasture. Ordinary meal ration continued in spring until cows refuse it.

47. YORK Co. Various crosses. Average weight of cows, 1,150 lbs.

Record: \$38 per cow, from creamery.

Winter ration : 8 lbs. equal parts oats, peas, and bran, with a little oil meal, 4 lbs. chaff, 8 lbs. straw, and 40 lbs. roots, turnips, mangels and potatoes.

Summer ration : Green corn, with pasture. Some meal when pasture is poor.

48. MIDDLESEX Co. Grade, Jerseys. Average weight of cows, 900 lbs.

Record : \$45 per cow.

Winter ration : 16 quarts oats, $\frac{1}{2}$ pint oil meal, with straw and corn fodder, *ad lib.*

Summer ration : Green corn, with pasture. Bran sometimes fed in August with good results.

49. GRENVILLE Co. Grade, Shorthorns. Average weight of cows, 1,200 lbs.

Winter ration : 6 lbs. bran, 4 lbs. corn meal, 36 lbs. ensilage, 10 to 12 lbs. hay, $\frac{1}{2}$ bushel beets.

Summer ration : Ensilage and green corn, with pasture.

50. GREY Co. Jerseys and Grade Jerseys. Weight of cows, from 700 to 1,000 lbs.

Winter Ration : 9 lbs. oats, 48 lbs. ensilage, 8 lbs. timothy hay, 14 lbs. roots, with straw *ad lib.*

Summer Ration : Green peas and oats, green corn, with pasture.

51. PRINCE EDWARD Co. Jerseys and Ayrshires. Average weight of cows, 900 lbs.

Winter Ration : 3 lbs. peas, 3 lbs. bran, 2 lbs. cottonseed meal, 40 lbs. ensilage, 10 lbs. clover hay, with straw *ad lib.* Sometimes oatmeal is substituted for bran.

Summer Ration : Green oats and peas, green corn, with pasture.

52. STORMONT Co. Ayrshire and Holstein Grades. Average weight of cows, 800 lbs.

Winter Ration : 4 lbs. oats, 2 lbs. bran, 45 lbs. ensilage, 10 lbs. timothy and clover hay.

Summer Ration : Green corn, with clover pasture.

53. DURHAM Co. Shorthorns.

Winter Ration : 5 lbs. of barley, oats and peas, in proportion of 2, 1, and 1, by weight, 7 lbs. corn fodder, 5 lbs. hay, 10 lbs. straw, and 30 lbs. roots.

Summer Ration : Green peas and oats, green corn, with pasture.

54. PERTH Co. Ayrshires, Holsteins, and Jerseys.

Winter Ration : 5 lbs. oats, 1 lb. flax seed, 40 lbs. ensilage, 15 lbs. straw, 30 lbs. turnips.

Summer Ration : Green corn, with pasture.

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55. STORMONT Co. Cross-bred Jerseys, Ayrshires, and Holsteins. Average weight of cows, 1,000 lbs.

Winter Ration: 10 lbs. equal parts barley and buckwheat, 40 lbs. ensilage, 10 lbs. straw, 5 lbs. roots.

Summer Ration: Green corn, with pasture.

56. CARLETON Co. Ayrshires, Grade Ayrshires, and Shorthorns. Average weight of cows, 1,150 lbs.

Winter Ration: 2 lbs. oil meal, 4 lbs. bran, 40 to 50 lbs. roots, 15 to 20 lbs. ensilage, 10 lbs. hay, 10 lbs. straw.

Summer Ration: Green corn, with pasture.

57. GRENVILLE Co. Grade Ayrshires.

Record: \$700 from cheese factory, from 20 cows.

Winter Ration: 4 quarts oats, barley, and peas, 4 quarts bran, 1 handful of flax seed, 2 bushels ensilage, $\frac{1}{2}$ bushel roots, some hay, with corn fodder *ad lib.*

Summer Ration: Green peas and oats, green corn, with pasture. Sometimes bran is fed.

58. ESSEX Co. Grade Jerseys. Average weight of cows, 800 lbs.

Record: 2,539 lbs. butter from 10 cows.

Winter Ration: 8 lbs. mixed oats and corn and cob meal, 40 lbs. ensilage, 10 lbs. straw.

Summer Ration: Green rye, clover, oats and peas, and corn, with pasture.

59. OXFORD Co. Ayrshires. Weight of cows, 800 to 1,000 lbs.

Winter Ration: 5 lbs. oats or bran, 2 lbs. oil meal, 50 lbs. ensilage, 8 lbs. clover hay.

Summer Ration: Green peas and oats, green corn, with pasture.

60. BRUCE Co. Grades. Average weight of cows, 1,100 lbs.

Winter Ration: 6 lbs. oats, 6 lbs. flaxseed, 20 lbs. corn fodder, 20 lbs. straw, 20 lbs. roots.

Summer Ration: Green tares, green corn, with pasture.

61. KENT Co. Grade Shorthorns. Average weight of cows, 1,150 lbs.

Winter Ration: 2 lbs. bran, 7 lbs. equal parts by measure of corn and oats, 24 lbs. ensilage, 12 lbs. corn fodder, 6 lbs. straw.

Summer Ration: Green corn with pasture, and 4 lbs. meal mixture mentioned above.

62. HURON Co. Holsteins. Average weight of cows, 1,300 lbs.

Record: 8,000 to 10,000 lbs. milk per head.

Winter Ration: 1 lb. flaxseed, 2 gallons equal parts peas, oats, barley, and bran, 30 lbs. corn fodder, 10 lbs. hay, 12 lbs. straw, 30 lbs. roots.

Summer Ration : Green oats and peas, green corn, rape, white turnips, with pasture.

63. MIDDLESEX Co. Grade Shorthorns. Average weight of cows, 1,000 lbs.

Winter Ration : 6 lbs. corn, $\frac{1}{2}$ lb. barley, $\frac{1}{2}$ lb. bran, $\frac{1}{2}$ lb. oil meal, 8 lbs. sugar beets or carrots, 2 bushels corn fodder, with straw *ad lib.*

Summer Ration : Green corn with pasture.

64. PERTH Co. Grade Holsteins. Average weight of cows, 1,100 lbs.

Winter Ration : 5 $\frac{1}{2}$ lbs. oats, 1 lb. oil meal, 21 lbs. timothy and Hungarian hay, 8 lbs. oat and barley straw, 17 lbs. turrips.

Summer Ration : Green corn with pasture.

65. YORK Co. Holsteins.

Record : \$228.08 from creamery, for 6 cows.

Winter Ration : 7 lbs. equal parts oats, corn, and peas, 52 lbs. of mixture made up of equal parts hay, pea straw, and other straw, cut and mixed with ensilage in proportion of 4 to 5, 20 lbs. roots.

Summer Ration : Green peas and oats, green corn, with pasture.

66. DUNDAS Co. Grade Ayrshires. Average weight of cows, 750 lbs.

Winter Ration : 4 to 6 lbs. bran and oil meal in proportion of 5 to 2 by weight, 35 lbs. ensilage, 5 lbs. hay, 4 lbs. straw.

Summer Ration : Alfalfa, green peas and oats, red clover, and green corn, with pasture.

67. FRONTENAC Co. Ayrshires. Average weight of cows, 1,000 lbs.

Record : Cows average 6,000 lbs. milk.

Winter Ration : 6 lbs. mixed black barley, peas, and oats, 40 lbs. ensilage, 6 lbs. hay, 25 lbs. roots, with some straw.

Summer Ration : Alfalfa and green corn, with pasture.

68. PERTH Co. Grade Shorthorns and Holsteins. Weight of cows, 1,100 to 1,200 lbs.

Record : \$365.24 from 8 cows, for cheese and butter.

Winter Ration : 4 lbs. bran, 4 lbs. oats, 2 lbs. barley, 50 lbs. ensilage, with oat straw *ad lib.*

Summer Ration : Pasture.

69. WENTWORTH Co. Crossbred Ayrshire and Shorthorn. Average weight of cows, 800 lbs.

Record : Average of \$45 per cow, for cheese and butter.

Winter Ration : 8 to 10 lbs. equal parts by measure of peas and oats, mixed with equal weight of bran, 20 lbs. ensilage, 15 lbs. turrips, 2 bushels chaff, with straw *ad lib.*

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Summer Ration : 1½ lbs. bran, green rye, peas and oats, and corn, with pasture.

70. GLENGARRY Co. Ayrshires. Average weight of cows, 850 lbs.

Winter Ration : 2 lbs. oil meal, 5 lbs. mixed oats and barley, 15 lbs. hay, 5 lbs. chaff, 4 lbs. straw, 15 lbs. roots.

Summer Ration : Pasture.

71. WELLINGTON Co. Grade Shorthorns. Average weight of cows, 1,100 lbs.

Winter Ration : 7 lbs. bran, 3 lbs. mixed oats and peas, 35 lbs. ensilage, 3 lbs. chaff, 6 lbs. straw, 15 lbs. roots.

Summer Ration : Green oats and peas, green corn, with pasture.

72. WELLINGTON Co. Shorthorn grades. Average weight of cows, 1,100 lbs.

Winter Ration : 10 lbs. oats, 3 lbs. peas, 25 lbs. corn fodder, 30 lbs. mangels, with straw *ad lib.*

Summer Ration : Green peas and oats, green corn, with pasture.

73. ELCIN Co. Shorthorns. Average weight of cows, 1,200 lbs.

Record : \$45 per cow for cheese and butter.

Winter Ration : 12 quarts equal parts bran and oats, with all they can eat of cut corn fodder $\frac{1}{3}$, straw $\frac{2}{3}$.

Summer Ration : Green peas and oats, green corn, with pasture.

74. PERTH Co. Grade Shorthorns. Weight of cows, 1,000 to 1,200 lbs.

Winter Ration : 6 to 10 lbs. equal parts by weight of peas, oats, and barley, 30 lbs. ensilage, 3 lbs. timothy hay, 14 lbs. straw, 10 to 12 lbs. mangels.

Summer Ration : Green peas and oats, green corn, with pasture.

75. DUNDAS Co. Grade Jerseys. Weight of cows, 800 to 900 lbs.

Record : \$59.79 per cow. (Cream shipped to Montreal.)

Winter Ration : A mixture of cut corn stalks with ears on, and cut sheaf oats and barley, all the cows can eat, with one feed clover hay, and $\frac{1}{3}$ bushel mangels.

Summer Ration : Green rye, peas, oats or barley, and green corn, with clover pasture.

It is of interest to note that 73 out of the 170 dairymen, feed ensilage, and under the head of "remarks," will be found some interesting testimony regarding ensilage and the corn plant. These remarks consist of extracts from correspondence, and deal with a variety of subjects.

REMARKS.

Northumberland Co.: In our experience, well cured ensilage is the best summer feed. If you have none, then supplement pasture by peas and oats, with corn for later feed.

Prince Edward Co.: I am of the opinion that a liberal supply of ensilage should be kept on hand at all seasons of the year. It is certainly the cheapest food that can be produced, and can be fed with satisfactory results at any time in the season.

Oxford Co.: If we were asked for our opinion as to what will most help the average dairy farmer, I think we should reply: Knowledge of a balanced ration, the Babcock test, and a summer silo; then varying the feed of individual animals according to capacity and condition, as shown by scales and close observation.

Grey Co.: Have never built a silo, believing the rank smell bad for dairy cows and their products.

Perth Co.: Fed an exclusive ration of silage, with 5 lbs. bran, in the beginning of the winter for three months. Cows ate from 50 to 70 lbs. of it, but in our climate it is not economical; it is like burning green wood, and there is not enough protein in it. All animals, including horses, were in good health from start to finish of experiment. (See ration 1.)

Peel Co.: We have learned something this winter. We fed no hay until two weeks ago, and our cows have done splendidly all winter. Fed 30 tons timothy hay and 500 bushels wheat last winter, and was in trouble more than once. Will never feed hay and wheat again if I can get a good crop of corn, and bran is not more than \$13 a ton. (See ration 5.)

Glengarry Co.: On 65 acres (30 acres corn and 35 acres hay) I have grown sufficient coarse feed for 150 head of cattle for entire winter, or seven months. (See ration 6.)

York Co.: My herd has done well this season, and I like corn ensilage better every year. (See ration 8.)

Stormont Co.: I have ensilage of the best quality, but am unable to feed it to milkers, as it affected the milk unfavorably for city trade. Milk from ensilage fed cows is produced at much less cost than from others. (See ration 10.)

Wentworth Co.: We are feeding cheaply, but have been obliged to do so, owing to a heavy stock and a light crop, excepting corn, which is our main reliance. The silo, with a stable at 60°, is the secret of our cheap feeding. (See ration 16.)

Middlesex Co.: I think corn is a good crop for the dairy business, but it should be put in the silo to get the best results.

Russell Co.: I fed turnips and mangels during November and December with good results. I find ensilage the best and cheapest food for winter, and all live stock will eat it.

Hastings Co.: Last season was dry and pasture scarce, but we were fortunate in having a large quantity of ensilage left over, and fed about half the usual winter feed during the summer.

Grey Co.: There are not many silos in this locality, a great many preferring to cut their corn and shock it in some place convenient to the barns.

Northumberland Co.: In future we shall grow corn enough to feed cows in the stable during summer. By growing more ensilage we can keep the cows more cheaply and get better returns than when pastured all the time. Cows are turned out at night.

Dundas Co.: I do not use a silo, as the milk company with which I am dealing will have nothing to do with the products of ensilage.

Perth Co.: We all like the silo. I have had one for five years, and have had nothing wrong with a cow during that time. We also feed ensilage to horses, and find it very satisfactory and economical winter feed. The drouth, frosts, and grasshoppers during the past two seasons have taught us that corn is a cheap and satisfactory substitute for hay.

Durham Co.: I have not seen a silo as yet. I think there are two in this township.

Leeds Co.: Intend to build a silo this summer. Think they are a grand thing.

Stormont Co.: Tares and oats are the best green fodder for milk cows that I have tried. Tares have no equal as green fodder for pigs, when fed with skim milk.

York Co.: Never fed potatoes until this year. Am feeding 6 lbs. per day, and cows are fond of them and seem to do well on them.

Bruce Co.: Last year was a severe one with us. Green fodder killed by frost; very poor pasture. Corn was our salvation and brought us through.

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Perth Co.: I find that dairying all the year round pays very well. I have my cows "come in" in October, November, December, April and May.

Durham Co.: I consider that the cows pay better than anything else on the farm.

Hastings Co.: Feed some meal in summer, but think it hardly pays where one has plenty of green feed and grass.

Hastings Co.: We endeavor to keep our cows and heifers in lactation to within three weeks of calving. Most of our cows "come in" during the winter. Each animal is fed in proportion to its wants—no set rules, except rigid exactness in the hours of feeding. (See ration 45.)

Dundas Co.: I believe in winter dairying, and in milking cows at least ten months. Have some cows that have been dry only four weeks that are now giving 40 lbs. milk per day on winter ration. (See ration 4.)

Oxford Co.: We feed twice a day. We stopped feeding three times a day about ten years ago and would never think of resorting to it again. (See ration 59.)

Bruce Co.: The people in this section have not gone into dairying in the proper manner, but the scarcity of grass will cause more green fodders to be grown in future. (See ration 60)

Huron Co.: We think meal in summer for cows would not pay in our locality.

Brant Co.: I generally feed hay at noon, but this year hay was dear and straw plentiful, so cows were fed straw, and did nearly or quite as well as formerly.

Frontenac Co.: I feed some alfalfa and it tend to sow more.

Wentworth Co.: Can make farm pay 8 per cent. interest on an investment of \$100 per acre, after allowing myself a salary of \$500 a year and paying all hired help.

Dundas Co.: Am using pure bred bulls on native stock, and breeding up. Started nine years ago. Use Babcock test, and weigh each cow's milk, keeping records.

Leeds Co.: I believe it pays to feed meal regularly and to keep it up during the whole season.

Principles of Feeding.

In the first place, we must understand that plants contain substances almost identical in composition with the substances which comprise the animal body. Animals eat plants, digest a portion of them, and use the digested portion in building up the different parts of their bodies, in producing milk, or in producing heat and energy. Thus, some of the substances form bone, some form flesh, muscle, blood, or milk; some form fat; while others are consumed in the production of heat, which is necessary to sustain animal life and energy.

The substances of which plants are composed may be grouped under five heads, as follows:

1. Water.
2. Ash, or mineral matter.
3. Protein (sometimes spoken of as "proteids," or "albuminoids.")
4. Carbohydrates, (also called "nitrogen free extract.")
5. Fat (sometimes called "ether extract.")

It is impossible to estimate accurately the value of the water which foods contain. In many cases the water seems to increase very materially the feeding value of the fodder, which fact is strikingly illustrated in the case of pasture grass and roots; and, apart from this feeding value, such succulent fodders have a beneficial effect in keeping the animal system in good working order.

Ash, or mineral matter, is used in the formation of bone, and is therefore of importance in feeding young growing stock. The high value of oats in feeding young animals is due to the fact that oats are especially rich in mineral matter, and are therefore good bone formers, while it is well known that an exclusive grain ration of corn is injurious to young stock, simply because corn is deficient in ash.

Protein contains nitrogen, and is concerned in the formation of flesh, muscle, blood, milk, hair, wool, horn, etc., and, probably to some extent fat. It may also supply heat and mechanical force, enabling the animal to do work. By work is meant any kind of muscular exertion.

Fat undergoes combustion in the body, producing heat which is necessary to create mechanical force. It is also stored up in the body as fat, to be used when required. Thus fat animals can live a long time without food, the fat that has been stored up supplying heat.

Carbohydrates are concerned chiefly in the production of heat and fat. They form the largest part of vegetable foods.

If an animal is fed upon protein alone, it cannot live long, but will become sickly and die in a comparatively short time. Protein is also more expensive than carbohydrates, and therefore it is a wasteful practice to feed more protein than is necessary. At the same time, in order to obtain the best results, a certain amount of protein is necessary, as is also a certain amount of fat; and the object of the feeder is to compound a ration which contains these three substances (protein, carbohydrates and fat) in the most suitable proportions. Such a ration is called a "balanced ration."

The relation which the digestible protein bears to the digestible carbohydrates and fat is called the "nutritive ratio" of a fodder. Thus, if we say that the nutritive ratio of a fodder is 1:7, we mean that there is one part of digestible protein to seven parts of digestible fat and carbohydrates.

The value of a fodder depends upon its composition and its digestibility. No fodders are entirely digestible, though roots and milk are very nearly so. We cannot therefore determine the nutritive ratio of a fodder from its composition only, but we must know what portion of each constituent is digestible.

The only basis upon which the different nutrients can be compared is in respect to their capacity for producing heat. In the production of heat, fat has about 2.2 times the value of carbohydrates; therefore, if we multiply any given amount of fat by 2.2, the product will represent the amount of carbohydrates which the given amount of fat is equal to. By some the fat is multiplied by 2.5, and by others by 2.29, or 2.3, but the factor 2.2 may be regarded sufficient for all practical purposes.

If we wish to find the nutritive ratio of a fodder, we must first find the digestible nutrients which it contains. Then the amount of fat is multiplied by 2.2 to express the amount of carbohydrates that it is equal to. The product thus obtained is then added to the amount of carbohydrates, which gives the total

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amount of carbohydrates which the fat and carbohydrates are together equal to. Then this number is divided by the amount of protein. For example, we will determine the nutritive ratio of barley. According to the table, it contains digestible nutrients in 100 pounds as follows: Protein, 9.5; carbohydrates, 66.1; fat, 1.2. Then, multiplying the fat by 2.2 we get $1.2 \times 2.2 = 2.64$. Adding this product to the carbohydrates we get $66.1 + 2.64 = 68.74$; therefore nutritive ratio = 9.5 to 68.74. But it is customary to express the digestible protein as 1, therefore we must divide by the amount of protein, which gives nutritive ratio, 1 to 7.23.

By means of many experiments, feeding standards have been compiled for different classes of stock. To German experimenters belongs the credit of first investigating the matter, and Dr. Emil Wolf, a noted German scientist, proposed the following feeding standard for dairy cows.

A dairy cow in full milk should receive per day and per 1,000 pounds live weight:

Total organic matter.....	24 lb.
Digestible protein.....	2.5 "
" carbohydrates.....	12.5 "
" fat.....	.4 "
Total digestible nutrients.....	15.4 lb.
Nutritive ratio.....	1 to 5.4

The German standard given above does not correspond with the practice of American dairymen; and, after obtaining information regarding the rations fed by a great many leading dairymen in the United States and Canada, the Wisconsin Experiment Station recommends the following standard, which is sometimes called the American standard ration for dairy cows:

Total organic matter.....	24.51 lb.
Digestible protein.....	2.15 "
" carbohydrates.....	13.27 "
" fat.....	.74 "
Total digestible nutrients.....	16.2 lb.
Nutritive ratio.....	1 to 6.9

It is possible that the American standard may prove more satisfactory than the German.

Composition of Fodders.

Below is given a table representing the amount of digestible nutrients in 100 lbs. of the most important fodders. The figures given in this table have been selected from various sources, and in some instances they will be found to

differ from those of other tables which have been published; but, on the whole, the variations are slight, and do not affect the practical value of the table.

The column under "Total Organic Matter" contains the total amount of digestible and indigestible protein, carbohydrates, and fat, in the different fodders.

POUNDS OF NUTRIENTS IN 100 POUNDS OF FODDER.

Fodder.	Digestible protein.	Digestible carbohydrates.	Digestible fat.	Total organic matter.
Pasture grass	2.6	10.6		
Green fodder corn	1.3	11.8	.5	18.0
Green clover	2.9	14.1	.7	19.5
Green rye	2.1	14.1	.4	27.1
Green oats	2.7	22.7	.4	21.6
Corn silage	1.3	14.0	1.0	35.3
Fodder corn, dry	3.7	40.4	.7	24.2
Red clover hay	6.5	34.9	1.2	66.8
Alfalfa hay	7.6	37.8	1.6	78.5
Timothy hay	3.0	43.9	1.3	84.2
Oat straw	1.6	41.4	1.2	82.4
Pea straw	4.3	32.3	.7	85.7
Potatoes	1.4	16.1	.8	79.8
Sugar beets	1.1	9.3	.1	20.1
Mangels	1.1	4.8	.1	12.6
Turnips	.6	5.5	.2	8.0
Carrots	1.0	7.1	.2	8.7
Corn	7.1	62.7	.3	10.4
Corn and cob meal	6.5	66.3	4.2	87.6
Oats	9.1	44.7	2.9	83.4
Barley	9.5	68.1	4.1	86.0
Wheat	9.2	64.9	1.2	86.7
Wheat bran (roller)	12.6	44.1	1.4	87.7
Wheat bran (stons)	10.1	47.5	2.9	82.4
Wheat shorts	11.6	45.4	3.2	83.1
Wheat middlings	12.2	47.2	2.9	83.6
Rye	8.3	65.5	1.2	84.5
Buckwheat	7.7	49.2	1.8	86.5
Pea meal	18.0	56.0	.9	85.4
Malt sprouts	19.8	36.2	1.7	84.5
Brewers' grains	3.9	9.5	1.3	23.9
Brewers' grains, dried	16.2	35.5	5.3	58.7
Gluten meal	25.0	49.4	5.6	89.7
Starch feed, wet	5.5	21.7	2.3	34.3
Cotton seed meal	36.9	18.1	12.3	84.6
Linseed meal, old process	28.3	32.8	7.1	86.1
Linseed meal, new process	27.2	32.9	2.7	84.1
Skimmed milk	3.1	4.7	.8	8.9
Buttermilk	3.9	4.0	1.1	9.2
Whey	.8	4.7	.3	5.9
	3.5	4.8	3.7	12.0

N. B.—Linseed meal is the American name for oil cake, or oil meal.

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Formulating Rations.

If we wish to formulate a ration, we must first make a trial ration of the foods we wish to use, find out how much of the different nutrients it contains, and, if the nutrients are not in the right proportion, we can add to or take away from the quantities of foods used in the trial ration. Suppose we wish to form a ration from clover hay, ensilage, and bran. For a trial ration we might take, bran, 8 lb.; clover hay, 6 lb., and ensilage, 40 lb.

By referring to the table we can find the amount of digestible nutrients in 100 lb. of each food, and therefore to find the amount in 1 lb. we must divide the numbers given in the table by 100. Thus we get:

	Protein	Carbo- hydrates.	Fat.	Total organic matter.
1 lb. bran contains .....	.126	.441	.029	.824
1 lb. clover hay contains .....	.065	.349	.016	.785
1 lb. ensilage contains .....	.013	.140	.007	.342
Therefore				
8 lbs. bran contain	1.008	3.528	.232	6.792
6 lbs. clover hay contain .....	.390	2.094	.096	4.710
40 lbs. ensilage contain .....	.520	5.600	.280	9.680
Total	1.918	11.222	.608	21.183

Comparing our trial rations with the American standard, we see that it is too low in all its constituents, especially in carbohydrates and total organic matter. If we try to make up the deficiency by means of ensilage or clover hay, our ration will become too bulky; while if we attempt to make it up with bran, the protein will be unduly increased. This would indicate that it is impossible to make a well balanced ration from the food stuffs selected, and the simplest way out of the difficulty would be to select some grain that is rich in carbohydrates and organic matter, with only a moderate amount of protein and fat. Looking over our list of food stuffs, we find that barley fulfils these conditions, while we might also slightly increase the amount of ensilage. We shall therefore add to our trial ration 2 lb. barley and 5 lb. ensilage.

Referring to our composition table we find :-

	Protein.	Carbo- hydrates.	Fat.	Organic matter.
1 lb. barley contains .....	.095	.661	.012	.867
Therefore				
2 lb. barley contain .....	.190	1.322	.024	1.734
5 lb. ensilage contain .....	.065	.700	.035	1.210
Trial ration contained	1.918	11.222	.608	21.182
Total	2.173	13.244	.667	24.126

As it now stands, the ration is intermediate between the German and American standards, and may be accounted approximately correct.

If we wish to find the nutritive ratio of the above ration, we first multiply the fat by 2.2 and add the result to the carbohydrates, thus: $(.667 \times 2.2) + 13.244 = 14.711$. Therefore nutritive ratio is 2.173 to 14.711, or 1 to 6.75.

The above is only an example of how the standard may be used in formulating a ration, and, from what has been said, it will be seen that a great variety of rations may be compounded which are practically the same in composition, and which will give equally good results. In every case the feeder must be guided by the kinds of food which he has at his disposal.

The digestibility and nutritive value of a food may vary very much, and the feeder must take this into consideration. Especially is this true of coarse fodders, such as hay, straw, ensilage, etc., the grain being more constant. For example, hay that is well cured is more nutritious than that which has become very ripe, or that has been too much exposed to the weather.

Then again, animals vary with regard to the amount of food which they are able to assimilate, making it necessary for the feeder to study the individual animals under his care, and to modify his methods according to results.

It will therefore be understood that while a feeding standard is valuable as a general guide, it cannot be blindly followed, and a great deal must be left to the intelligence of the feeder.

Discussion of Some Rations Furnished in Report.

For the purpose of comparing some of the rations used by Ontario dairymen, with the German and American standards, a few of the more definite ones have been selected, and their digestible nutrients ascertained. Too much importance must not be attached to the composition of these rations, since, in some cases, the quantities of feed given are simply approximations. However, the rations are sufficiently definite to be of interest and value to the careful student.

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" 72 ...

For convenience of reference, the German and American standard rations for dairy cows are placed at the head of the list. It must be borne in mind that these standards represent the amounts of organic matter, and of digestible nutrients required per 1,000 lbs. live weight of the animal; and that the term "total organic matter" means the total amount of dry matter furnished in the ration, including both the digestible and indigestible constituents of the food.

The constituents of the rations analyzed below have all been calculated per 1,000 lbs. live weight of cows, and the number opposite each ration corresponds with its number in the report, so that it can readily be referred to.

Table Showing Constituents of some Ontario Rations for Dairy Cows.

Number of ration.	Total organic matter.	Digestible matter.				Nutritive ratio.
		Protein.	Carbo-hydrates.	Fat.	Total.	
		lbs.	lbs.	lbs.	lbs.	
German Standard	24.00	2.50	12.50	.40	15.40	1: 5.4
American Standard	24.51	2.15	13.27	.74	16.16	1: 6.9
No. 1	25.47	2.27	12.83	.81	15.91	1: 6.4
" 2	29.80	2.07	15.12	.32	17.31	1: 7.6
" 5	27.64	2.34	19.20	.71	22.25	1: 8.8
" 6	21.21	1.90	11.00	.84	13.74	1: 6.6
" 8	32.19	1.90	17.68	1.06	20.64	1: 10.5
" 9	27.52	2.04	14.72	.73	17.49	1: 8.0
" 11a	22.30	1.13	11.53	.60	13.31	1: 11.4
" 11b	25.01	1.99	12.56	.81	15.36	1: 7.2
" 12a	26.46	1.89	14.71	.73	17.13	1: 9.7
" 12b	26.47	1.96	14.26	.62	16.84	1: 8.0
" 13	26.35	1.50	13.16	.65	15.31	1: 9.7
" 14	29.84	2.29	17.05	.85	20.19	1: 8.3
" 15	25.56	1.66	13.15	.56	15.27	1: 9.2
" 17	28.31	2.25	14.30	.74	17.29	1: 7.5
" 18a	29.82	3.30	18.41	1.20	22.91	1: 6.4
" 18b	24.93	2.95	13.68	1.06	17.59	1: 5.4
" 19	18.52	1.31	9.60	.46	11.36	1: 8.1
" 20	23.42	2.77	11.12	.66	14.55	1: 4.5
" 23	28.17	1.65	15.15	.41	17.21	1: 9.7
" 25	31.57	1.35	16.05	.42	17.82	1: 12.6
" 31	25.94	2.67	13.73	.57	16.37	1: 6.7
" 32	23.99	1.45	12.70	.44	14.59	1: 9.4
" 35	19.43	1.27	9.95	.54	11.73	1: 8.8
" 36	28.18	2.10	14.42	.85	17.37	1: 7.7
" 37	24.83	2.40	13.26	.60	16.35	1: 6.1
" 39	26.17	2.29	13.36	.65	16.80	1: 6.4
" 46	28.00	1.60	15.05	.55	17.20	1: 10.1
" 49	25.85	1.76	14.25	.63	15.88	1: 8.9
" 50	26.54	1.59	14.39	.82	16.80	1: 10.2
" 51	26.66	2.88	11.52	.86	15.26	1: 4.7
" 72	26.14	2.13	14.92	.68	17.73	1: 7.7

Criticisms and Suggestions Regarding Rations Shown in Table.

Ration No. 1: A well-balanced ration, though the value of the oat and vetch hay had to be approximated.

Ration No. 2: Also a fairly well-balanced ration, but it is probable that the quantity of hay has been over-estimated, making the total organic matter too high.

Ration No. 5: Too high in organic matter and carbohydrates, but protein and fat satisfactory. No doubt straw has been over-estimated. Reducing the quantity of straw would narrow the ratio and make the ration very well-balanced.

Ration No. 6: Estimated on basis of 2 lbs. cotton seed meal, 4 lbs. shorts, 50 lbs. ensilage and 5 lbs. hay. Too low in all constituents except fat, though nutritive ratio is satisfactory. Slightly increasing the shorts, and adding a little clover hay, would tend to remedy the fault.

Ration No. 8: No doubt there is some mistake here in estimating the quantities of fodder, as the ration appears abnormal.

Ration No. 9: The straw has probably been over-estimated, as the ration is high in organic matter and carbohydrates. A less quantity of straw would also tend to balance the ration. Making this allowance, the ration looks like a very good one.

Ration No. 11a: Low in all constituents, especially protein. The protein could not be materially increased by feeding more straw, though the organic matter and carbohydrates could thus be made satisfactory. *No. 11b* shows the same ration with 3 lbs. old process oil meal added. The improvement will be noted.

Ration No. 12a: By referring back to *Ration No. 12* as given in the report, it will be seen that 3 lbs. pea meal is sometimes fed in place of 3 lbs. corn meal. *No. 12a* represents ration with corn meal, and *No. 12b* with pea meal. The pea meal has made the ration better balanced, though it is still deficient in protein.

Ration No. 13: The main fault of this ration is that it is too low in protein. If the oil meal mentioned is fed in place of part of the oats, it will make an improvement.

Ration No. 14: Abnormally high in organic matter and carbohydrates. It is quite probable that the rough fodders have been over-estimated. Reducing the corn fodder would balance the ration very well.

Ration No. 15: Very low in protein. The addition of the oil meal mentioned would improve the ration.

Ration No. 17: Rather high in organic matter and carbohydrates, though it may be called a fairly well-balanced ration. The weight of rough fodders has likely been over-estimated.

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Ration No. 18: *No. 18a* represents the ration as given in the report, and it will be noticed that it is abnormally high in all its constituents. This indicates that there must be some mistake in describing the ration, and therefore it was calculated again, with 20 lbs. ensilage instead of 20 lbs. corn fodder, and numbered *18b*. The change has made an improvement, though it is still very high in *protein* and *fat*, which would indicate an expensive ration.

Ration No. 19: Very low in all constituents except *fat*, which indicates that quantities of fodder have been under-estimated.

Ration No. 20: In calculating this ration the straw has not been taken into account, which renders the nutritive ratio very narrow. The most marked feature of the ration is the large amount of *protein*, which indicates an expensive ration.

Ration No. 23: Low in *protein*. If bran were substituted for barley, it would make an improvement.

Ration No. 25: Extremely low in *protein*, and high in *carbohydrates* and *organic matter*. Corn and barley are both low in *protein*.

Ration No. 31: Apparently a very well balanced ration.

Ration No. 32: Very low in *protein*. The addition of a few pounds of bran would improve the ration.

Ration No. 35: Low in all constituents except *fat*. Cows probably eat more straw than is estimated, but this would not sufficiently increase the *protein*. The need of more bran or oil meal is indicated.

Ration No. 36: A very well balanced ration. It has been calculated for timothy hay, but if clover hay is fed, the ration would be still better balanced.

Ration No. 37: A well balanced ration, indeed. The 9 lbs. mixed bran and shorts have been calculated as shorts, but this makes very little difference.

Ration No. 39: Also an exceptionally well balanced ration.

Ration No. 46: Too low in *protein*, and high in *carbohydrates*. Could be made better balanced by increasing the amount of peas and bran. It has been assumed that cows eat 10 lbs. straw, which is probably too high an estimate.

Ration No. 49: Rather low in *protein*. This could be remedied by increasing the amount of oil meal, or by adding bran.

Ration No. 50: Low in *protein*. Substituting some bran or oil meal for part of the oats, would increase the *protein*.

Ration No. 51: Very high in *protein*, which indicates an expensive ration. In calculating ration, no allowance was made for straw, which makes the nutritive ratio narrower than it would otherwise be.

Ration No. 72: A fairly well balanced ration, though containing a large amount of meal.

Conclusion.

As stated before, no standard of feeding can be blindly followed, and it may be quite possible that some of the suggestions offered above will prove impracticable for the dairyman using the ration. A farmer must make the best possible use of the fodders at his disposal, and he may sometimes find that it pays him better to use a comparatively poorly balanced ration, rather than sell the grain he has on hand in order to purchase fodders with which to form a balanced ration. The suggestions and criticisms, therefore, may be taken for what they are worth, as they are intended merely as helps to those who may decide to copy any of the rations mentioned. Considerable variety is offered, and a study of the table, in connection with the study of the rations represented therein, will be a help in making an intelligent selection.

Another very important point must not be overlooked. Feeding is only one side of the question, and, though it may do much, it cannot do all. The value returned for the food consumed depends upon the cow, and a *good* cow fed upon a poorly balanced ration, will do better for her owner than a poor cow fed in the most scientific manner. *Feeding, breeding, and weeding* are inseparably connected in the successful maintenance and improvement of a dairy herd.

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Best, J.
Blackbur
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Baird, C.
Bower, J.
Beuning,
Begg, Vic
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Brickman
Brown, S.
Batho, J.
Bray, A.
Byers, H.
Barber, J.
Bull & Sc
Bollert, H

Clemons,
Collins, O
Claxton, C
Crosby, J.
Carlaw, T.
Christie, I
Casselman
Cameron,
Chisholm,
Cook, J...
Campbell,
Clow, J...

Dickson, W
Davis, B...
Dench, J. :

APPENDIX.

—

The Live Stock Committee is indebted to the following gentlemen, for information :

Abbott, Wm	Lakefield.	Derby, A.	Hampden.
Anderson, Jas	Guelph.	Dawson, A. W	Oldcastle.
Anderson, J.	Alsfeldt.	Dimma, J. & A. F.	Cedar Grove.
Arbogast, J.	Sebringville.	Donald, G	Kilsyth.
Bain, R. H	Fullarton.	Davidson, T.	Spring Valley.
Beck, S. K	South Cayuga.	Earl, J. F.	Elgin.
Brodie, R. A.	Gladstone.	Elliott, T.	Markdale.
Best, J. H.	Balmoral.	Elliott, J. E.	Woodbridge.
Blackburn, J.	Dresden.	Ferguson, W.	Inverary.
Brock, J.	Millbrook.	Fallis, J.	Millbrook.
Bird, J.	Stirling.	Fox, J. P.	Winchester.
Baird, C.	Motherwell.	Farlinger, C. F.	Cornwall.
Bower, J. P	Seeley's Bay.	Finkler, C. H.	Newburg.
Benning, D.	Williamstown.	Garbutt, R.	Lakefield.
Begg, Victor	Moose Creek.	Gardner, J.	Cornwall.
Burgess, R. L.	Burgessville.	Groves, J. L.	Cornwall Centre.
Blakely, R.	Roblin's Mills.	Gifford, A.	Meaford.
Brickman, W. A	Ameliasburg.	Goodfellow, S.	Duncan.
Brown, S. Y	Addison.	Gilmour, A.	Hampden.
Batho, J.	Kenilworth.	Gilroy & Son, C. J.	Glen Buell.
Bray, A.	Mapleton.	Hotson, J. L.	Avonbank.
Byers, H.	Hampden.	Hemming, J. W.	Welland.
Barber, J.	Guelph.	Hume, A.	Burnbrae.
Bull & Son, B. H.	Brampton.	Harkness A. D.	Irena.
Bollert, H.	Cassel.	Hope E.	Chesley.
Clemons, G. W.	St. George.	Hartman, J. W.	Elm Hedge.
Collins, O.	St. George.	Henry, F.	Whitechurch.
Claxton, G	Inverary.	Hellyer, J.	Kenilworth.
Crosby, J.	Campbellford.	Hodgins, C. C.	Lucan.
Carlaw, T. B.	Warkworth.	Hunter, S.	Rockton.
Christie, D	Winchester.	Jones, J. M.	Bowmanville.
Casselman, W. H.	Chesterville.	Jamieson, J.	Cardinal.
Cameron, A.	Glencoe.	Johnston, J. R	Whitechurch.
Chisholm, H. B	Wallbridge.	Knight, J.	Elginburg.
Cook, J.	Warburton.	Keegan, R.	Kemptville.
Campbell, J. T.	South Finch.	Kotcheson, D. H	Menie.
Clow, J.	Whitechurch.	Kennedy, A.	Winchester.
Dickson, W	Attwood.		
Davis, B.	Burnaby.		
Dench, J. S.	Trenton.		

- Kennedy, A. Vernon.
 Kenny, W. W. Guelph.
- Langford, J. A. Kent Bridge.
 Little, R. E. Teeswater.
 Lamb, J. A. Walkerton.
 Lamb, J. T. Walkerton.
 Leitch, D. Grant's Corners.
 Line, J. A. Sherwood.
 Loton & Sons, R. Attwood.
- Macpherson, D. M. Lancaster.
 McNish, W. H & C. H., Lyn.
 McKeen, J. Leith.
 McGregor, J. Oranstance.
 McMaster, J. Orangeville.
 McKenzie, G. Bolton.
 McRoberts, A. Bothwell.
 McLean, D. H. South Finch.
 McIntyre, D. N. Paisley.
 McBeath, T. Paisley.
 Macfie, J. W. Appin.
 McKee, J. & H. Norwich.
 McKay, J. Woodbridge.
 Mallory, B. Frankford.
 Mountain, W. Avonbank.
 Moore, C. D. Peterborough.
 Meiklejohn, W. Big Springs.
 Milton, W. J. Thamesville.
 Modeland, H. T. Sarnia.
 Morrison, J. Bishop's Mills.
 Madden, G. S. Napanee Mills.
 Monroe, L. Addison.
 Mott, J. Rock Spring.
- Nichols, D. Philipsville.
 Nugent, W. Newburg.
 Nixon, H. R. St. George.
 Nichol, W. Plattsville.
- Overholt, J. W. Hewitt.
 Oliver, A. Motherwell.
- Penhale, T. J. Mapleton.
 Pierson, J. Burgoyne.
 Pike, J. Locust Hill.
 Pulfer, J. Brampton.
- Ritchie, A. Inverary.
 Rathbun, E. W. Deseronto.
 Richardson & Son, M., Caledonia.
 Roth, C. F. Lansdowne.
 Rowand, W. Walkerton.
- Rowand, A. Walkerton.
 Ross, J. Whitechurch.
 Robertson, T. Dunsford.
 Reid, I. W. Reaboro.
 Rolph, W. Markham.
 Rice, A. & G. Currie's Crossing.
 Reesor, R. Locust Hill.
 Reid & Co., R. Hintonburg.
- Swanson, C. D. St. Marys.
 Sprague, J. A. Demorestville.
 Stewart, jr., Wm. Menie.
 Scott, R. Meyersburg.
 Stewart, G. Flesherton.
 Shaver & Son, A. Winchester Springs.
 Sterritt, W. Motherwell.
 Smith, H. & W. Hay.
 Sharp, J. Bath.
 Sparrow, J. Williscroft.
 Stover & Sons, A. J. Norwich.
 Stover, W. Norwich.
 Sloan, W. A. Ventnor.
 Stortz, J. Potherton.
 Smith, W. M. & J. C. Fairfield Plains.
 Smith & Son, J. H. Highfield.
 Stevenson, R. S. Ancaster.
- Tucker, B. C. Sine.
 Telfer, J. Newbury.
 Tate, R. R. Seeley's Bay.
 Thorpe, S. D. Hulbert.
 Topper, G. Woodbridge.
 Turner, J. Locust Hill.
- Ure, D. Windsor.
- Vandervoort, S. S. Sine.
- Werry, P. Tyrone.
 Wright, N. Orangeville.
 Woodland, J. Orangeville.
 Wilson, H. Caledon East.
 Wakeley, J. Bolton.
 Wait, S. C. St. George.
 Whitelaw, W. Meaford.
 White, D. O. Mapleton.
 Wallis, J. W. Woodbridge.
 Wallis, W. A. Humber.
 White, R. E. Perth.
- Yorke, A. Gladstone.
 Yuill, A. Carleton Place.

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EASTERN ONTARIO DAIRYMEN'S ASSOCIATION.

R. G. Murphy, Elgin, Ont., Secretary.

The annual meeting will be held at Brockville, on January 6th, 7th and 8th. The principal speakers will be Hon. Sidney Fisher, Hon. John Dryden, Ex-Governor W. D. Hoard of Wisconsin, and Profs. Robertson, Dean, Fletcher and Ruddick.

THE ONTARIO CREAMERIES' ASSOCIATION.

Mark Sprague, Ameliasburg, Ont., Secretary.

The annual meeting will be held at St. Marys on January 13th, 14th and 15th. Principal speakers, Hon. W. D. Hoard, of Wisconsin, Hon. John Dryden, Hon. S. A. Fisher, Prof. Robertson, Dr. James Mills, Prof. Dean, Prof. James Fletcher.

THE DAIRYMEN'S ASSOCIATION OF WESTERN ONTARIO.

J. W. Wheaton, London, Secretary.

The next meeting will be held at Brantford, on January 19th, 20th, 21st. Principal speakers, Hon. W. D. Hoard, of Wisconsin; J. H. Monrad, of Illinois; Hon. A. S. Hardy, Premier of Ontario; Hon. Sidney Fisher, Minister of Agriculture for Canada; Hon. John Dryden, Minister of Agriculture for Ontario; Hon. Thos. Ballantyne, Stratford; Andrew Pattullo, M.P.P., Woodstock; Prof. J. W. Robertson, Dominion Dairy Commissioner; Prof. H. H. Dean, of the Agricultural College, Guelph.

THE POULTRY ASSOCIATION OF ONTARIO.

Thos. A. Browne, London, Ont., Secretary.

The twenty-third annual meeting and exhibition will be held at Guelph, in the Drill Shed, January 11th to 16th. A public meeting will be held on Thursday, January 13th, at 8 p. m. Addresses by Hon. John Dryden, Dr. James Mills, Mr. Thos. Gowdy, A. G. Gilbert and others.

