

Taking 20 tons as an average crop of mangels or sugar mangels, and 16 tons as an average crop of sugar beets, the average cost of mangels in the root house will be per ton, \$1.90, and of sugar beets, \$2.37½.

In our field crops of mangels, sugar mangels and sugar beets, at the Central Experimental Farm, the average cost per ton in a number of years has been \$1.75, safe in the root house.

#### COMPOSITION AND FEEDING VALUES.

The following notes on the chemical composition of the three kinds of roots have been prepared for this bulletin by Mr. Frank T. Shutt, M.A., Dominion Chemist.

Mangels, in common with other farm 'roots,' are characterized by a high water-content (in the neighbourhood of 90 per cent) but, in spite of this fact, they constitute a forage crop of very considerable value. This is largely due to the fact that the 'dry matter' is composed chiefly of sugar and pectin, constituents which are non-nitrogenous nutrients (carbohydrates) extremely easy of digestion and of very considerable value in the animal economy, as a source of heat and energy. They may also serve in the animal system for the production of fat, as has been conclusively shown by recent experiments.

Apart from their intrinsic value from the feeding standpoint, there are several qualities or properties possessed by mangels which must not be overlooked. Of these, succulence stands first, mainly because it enhances palatability and associated as it is here with ready and complete digestibility of the nutrients, is undoubtedly a factor of no small importance in the keeping up of the milk flow.

Stock feeders of experience have recognized roots as performing a useful function in keeping animals thrifty and healthy. This is largely owing to their richness in saline matter which consists chiefly of potash compounds. These are mildly laxative and possibly possess other beneficial medicinal properties.

And lastly it would seem that roots may materially aid in the digestion of the rest of the ration and prove useful in the proper distention of the digestive apparatus.

The seeds of many varieties of mangels are to be found on the market and for a number of years past the more important of these varieties have been analyzed in the experimental farm laboratories.

Reference to annual reports of the Chemical Division will show that very considerable differences in the dry matter and sugar-content exist among these varieties. In the following table, the highest and lowest among the mangels examined have been given, for the past ten years.

DRY MATTER AND SUGAR IN MANGELS.

Year.	Number of Varieties.	DRY MATTER.		SUGAR IN JUICE.	
		Maximum.	Minimum.	Maximum.	Minimum.
		p.c.	p.c.	p.c.	p.c.
1900 .....	3	11.14	8.19	6.15	2.64
1901.....	3	9.63	9.10	5.02	4.15
1902.....	7	16.61	10.24	9.95	5.24
1903 .....	5	14.74	10.89	10.40	6.17
1904 .....	10	13.92	9.24	9.18	4.75
1905.....	17	12.82	7.52	6.95	1.93
1906.....	16	13.52	7.99	7.53	2.22
1907.....	10	14.61	10.78	8.63	6.09
1908.....	12	13.14	10.66	7.07	3.87
1909.....	14	12.66	8.94	7.40	4.47