

3 proven sires whose daughters had averaged approximately 400 lb. of butterfat on a maturity basis were used. Unfortunately, the bulls proved to be of rather low fertility and a number of cows were not made available for reservice. A total of 749 cows are believed to have conceived to artificial insemination. In general, the ratio of conceptions to inseminations was about what would have been expected from natural services with the same bulls. The value of artificial insemination is well illustrated by the fact that 467 cows are believed to be in calf to the 3 proven sires, which between them in the previous season left only 30 calves. If sufficient proven sires are available, it is intended to conduct a further field trial on a larger scale next season.

Heritable Red Blood Cell Characters of Dairy Cows. Investigations have been continued, and reagents are being prepared to enable a survey of these characters to be made in New Zealand dairy cattle with a view to exploring the possibility of their inheritance being associated with genetic characters responsible for production.

Contagious Abortion. There has been an increased demand for free vaccination of calves against contagious abortion. This year some 2,000 dairy-farmers have availed themselves of this service and 35,000 doses of vaccine have been issued. The first results from field vaccination have become available this year. In 1942, 630 calves and yearlings were vaccinated in 33 herds. Data are available for 464 of these which were mated to calve in 1943. The results shown in the following table were obtained:—

Calving Year.	Cows Three Years and over unvaccinated Both Years.		Two-year-old Heifers unvaccinated 1942, vaccinated 1943.		
	Mated.	Abortions.	Mated.	Abortions.	Empty.
1942	1,890	186 (10%)	522	139 (27%)	..
1943	1,456	183 (13%)	464	25 (5%)	35 (8%)
New Zealand average	4%	..	10%	10%

Although the numbers are small, the results are very encouraging, as vaccination has apparently reduced abortions in two-year-olds from 27 per cent. to 5 per cent. in herds in which abortions in older cows remained well above the New Zealand average.

Nutrition of Dairy Cows and Pigs.—Experimental work has been continued at Ruakura, and the following general conclusions may be recorded. Rotational grazing of calves ahead of the cows after weaning eliminates the unthriftiness, scouring, and high parasitic infestation which are such serious problems under the usual set-stocking in calf paddocks. Mature pampas grass (one year's growth) has the nutritive characteristics of poor-quality hay. The feeding of reasonable meal supplements to grass-fed pregnant cows is profitable. Restricting wintered Berkshire-type stores to 5 gallons of separated milk or buttermilk per day after they reach 130 lb live weight results in 80 per cent. to 90 per cent. of them grading No. 1 Prime as baconers. Spring weaners appear to over-fatten more readily, and optimum restriction levels are still in process of determination. The chemical investigation of the quality of pig-fats has been continued.

Copper Deficiency.—It has been shown that considerable areas of peat land in New Zealand are naturally deficient in copper. Cattle grazing on these develop "peat scours," with seriously reduced production, while the lambs develop spinal trouble. Methods of alleviation of the deficiency are being studied, and it has already been demonstrated that top-dressing with copper compounds is effective.

Cobalt Deficiency.—Experiments conducted at Mamaku have indicated that top-dressing with 20 oz. of cobalt sulphate per acre maintains a satisfactory cobalt concentration in pasture for at least three years; while one paddock top-dressed with 40 oz. per acre has remained safe for six years. These heavy top-dressings, though expensive, may be useful in hill country, where annual top-dressing is uneconomic.

Parasitology.—Investigations have been continued on parasitism in young sheep both in the field and under controlled pen conditions. Dried grass has been used as a worm-free diet in the pens where internal infestations have been studied. Phenothiazine has been used in field trials in both lambs and calves to study its effect on growth and mortality rates. Post-mortem material collected from unthrifty calves indicates that the more important parasites are *Ostertagia* spp., *Trichostrongylus axei*, *Cooperia* spp., and *Dictyocaulus viviparus*. A study has been made of the lesions produced by young cestode larvæ in sheep to determine their relationship to the so-called parasitic lesions which cause heavy condemnation for export in lambs' livers at the freezing-works. An experiment is being conducted to study the effect on the number of such lesions of raising lambs in a dog-proof paddock at Ruakura. Hydatid investigations have been continued in collaboration with the Live-stock Division and the Hydatid Research Department of the Medical School.

Poison Plants.—A study of the nitrate content of mangels and its relation to their toxicity for pigs has been initiated. A study of the toxicity of native and introduced plants has been continued. A series of papers has been published on the alkaloids of leguminous plants.

Fish-liver Oils.—Chemical investigations of fish-liver oils have been intensified with a view to assisting in establishing the New Zealand industry on a sound footing.