

**Trace mineral levels in Alberta feeds.** P. J. Martin,\* D. L. Massey, D. H. Lavery, A. Wittmeir, and G. O. Truscott. Soil and Feed Testing Laboratory, Alberta Department of Agriculture, Edmonton, Alta.

Four hundred and seventy-two samples of grain and 680 samples of hay, silage, and straw were analyzed for iron, copper, zinc, and manganese. The concentrations of Fe, Cu, Zn, and Mn were compared with those specified by the Agricultural Research Council as minimum requirements for cattle. Selenium analyses were conducted on 527 samples of hay and 394 samples of barley grain. The minimum Se requirement was considered to be 100 ppb. Twelve percent of the roughages contained less than 10 ppm of Cu, the recommended minimum level for cattle. The percentages of barley grain, oat grain, and wheat grain containing < 10 ppm Cu were 59.1, 12.5, and 81.5, respectively. Ninety-six percent of all samples tested contained less than 50 ppm of Zn, the recommended minimum level. Fifty-eight percent of the roughages contained less than 40 ppm of Mn, the minimum requirement. The percentages of barley grain, oat grain, and wheat grain containing < 40 ppm of Mn were 97, 42, and 68, respectively. Only 0.3% of the total samples tested contained less than 30 ppm of Fe, the minimum required level. Fifty-five percent of the hay samples and 44% of the barley grain samples contained fewer than 100 ppb of Se. Barley grain samples from the drier soil zones in southeastern Alberta contained higher levels of selenium than those from other areas.

**A comparison of feeding milk replacers to dairy beef calves for either 4 or 8 wk.** R. F. Welton,\* J. M. Dalrymple, and V. Wagemans. Mutual Products Ltd., Morrisburg, Ontario.

Forty-eight male Holstein calves were allotted to four equal groups: treatment groups A and B were weaned at 4 wk; treatment groups C and D were fed milk replacer containing 20% protein and fat; and treatment group C received milk replacer containing 20% protein and 10% fat. Calf starter and water were provided ad libitum after the 1st wk. All calves were weighed at 4, 8, and 12 wk. Weight gains to 8 wk for combined treatments (C-D) were greater ( $P < 0.05$ ) than combined treatments (A-B) (44.3 vs. 21.9 kg). At 12 wk cumulative weight gains were not different ( $P > 0.05$ ). Treatment groups A-B compensated for lower milk replacer consumption by consuming more ( $P < 0.05$ ) calf starter than groups C-D, (43.2 vs. 33.1 kg/8 wk). At 12 wk total production costs per kilogram of calf were not affected

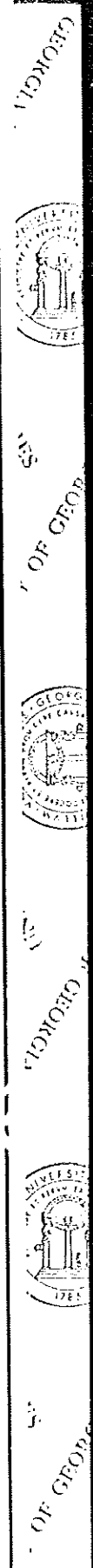
( $P > 0.05$ ) by treatments. In a subsequent feeding trial, milk replacers A and B were fed to male Holstein calves. Calves were weaned by performance criteria rather than age. This weaning method appears to produce more economical gains than weaning at 4 or 8 wk.

**The economics of using high levels of spray whey in milk replacers for veal production.** R. F. Welton,\* J. M. Dalrymple, and V. Wagemans. Mutual Products Ltd., Morrisburg, Ontario.

Four groups of 12 male Holstein calves were started on milk replacers containing various levels of whey. Levels of whey in starter formulae were 12.5, 15, and 41%. After 4 wk weight gains were not different ( $P > 0.05$ ) for the four treatments. At 5 wk, treatments were arranged in a  $2 \times 2$  factorial design with levels of whey (15 and 41%) and concentration of reconstituted milk (15 and 18%) as factors. Treatment groups A and B received milk replacers containing 15 and 41% whey, respectively, at 15% concentration. Treatment groups C and D were fed the 15 and 41% whey products, respectively, at 18% concentration. During the 9-12-wk period average gains for treatment groups A, B, C, and D were 44.9 b, 40.2 a, 43.4 ab, and 40.9 ab kg, respectively (a, b indicate difference,  $P < 0.05$ ). Average feed conversions during the 9-12-wk period were 1.29 a, 1.37 ab, 1.33 ab, and 1.41 b kg/kg gain, for treatments A, B, C, and D, respectively. Average milk replacer costs to market (14.5 wk) for A, B, C, and D were 1.10, 1.05, 1.10, and 1.07 \$/kg gain, respectively. Treatment groups A, B, C, and D had respective total costs (feed, drugs, labor, heat, and hydro) of 1.30, 1.30, 1.30, and 1.31 \$/kg liveweight.

**Formaldehyde treatment of rapeseed meal for lactating dairy cows.** P. L. Burgess\* and J. W. G. Nicholson. Agriculture Canada, Fredericton, New Brunswick.

Three groups of eight Holstein cows in early lactation were fed concentrates containing: (A) 22% rapeseed meal (RSM) treated with 0% formaldehyde; (B) 22% RSM treated with 0.34% formaldehyde; and (C) 12% RSM treated with 0.34% formaldehyde, to determine the effect of formaldehyde treatment of RSM on the efficiency of protein utilization for milk production. During the 12-wk trial concentrates were fed according to milk yield, whereas corn silage was offered ad libitum and grass hay was limited to 3 kg/cow per day. Group C consumed less ( $P < 0.05$ ) total dry matter (DM),



silage DM, and concentrate DM, and produced less milk than groups A and B, and less fat content milk (FCM) than group A. Formaldehyde treatment significantly ( $P < 0.05$ ) increased the fat and protein content of the milk, decreased the molar percentage of rumen propionate, and increased butyrate levels. Rumen ammonia N and blood urea N were lower ( $P < 0.05$ ) for group C than for group A. It was concluded that formaldehyde treatment of RSM was effective in increasing the fat and protein content of milk.

**Formaldehyde treatment of rapeseed meal for growing-fattening beef calves.** J. W. G. Nicholson and P. L. Burgess.\* Agriculture Canada, Fredericton, New Brunswick.

Two experiments were conducted with beef calves to measure the response in animal performance when the rapeseed meal (RSM) used to supplement low-protein rations was treated with formaldehyde. The daily ration in experiment 1 was whole potatoes ad libitum, 4 kg of corn silage, and 1.5 kg of a protein-mineral-

vitamin supplement. The supplements were: (1) control based on RSM; (2) RSM treated with 0.34% formaldehyde; (3) soybean meal; and (4) control with 0.33% choline chloride added. The 36 calves were 7-mo-old crossbreds averaging 202 kg at the beginning of the 71-day feeding trial. The daily consumption of potatoes and average daily gains (kg) for calves receiving each of the supplements were as follows: (1) 17.6, 0.92 *b*; (2) 16.8, 1.01 *ab*; (3) 18.3, 1.12 *a*; and (4) 18.3, 0.99 *ab*, (*a,b* differ  $P \leq 0.05$ ). In experiment 2 the 10-mo-old beef heifers were fed cane molasses + 2% urea ad libitum + 3.6 kg of corn silage and either 0.6 or 0.32 kg of RSM per day. Half of the heifers were fed control RSM and the others RSM treated with 0.3% formaldehyde. The average daily consumption of molasses and weight gains by the heifers were: low level control 6.37, 0.49 *b*; low level formaldehyde treated, 6.39, 0.63 *a*; high level control, 6.32, 0.70 *a*; high level formaldehyde treated, 6.39, 0.69 *a* kg (*a,b* differ  $P \leq 0.01$ ). It was concluded that formaldehyde treatment of RSM improved animal performance on rations low in preformed protein.

### Joint Session with Structure and Environment Division of CSAE

**A mathematical approach to the control of humidity and temperature in confined piggeries.** S. Thauvette\* and A. Marquis, Macdonald College of McGill University, Ste.-Anne-de-Bellevue, Québec.

At low temperature (10 F and less), ventilation rates to control the humidity level are generally greater than those to control temperature. A new approach to control both humidity and temperature is developed; heat is removed by ventilation, and humidity by condensation. The mathematical model was based on a finishing piggery. Thermodynamic analysis was performed on the system; the building's air is circulated through a cylinder extending outside of the barn for a length "L," then returned to the building. In this cylinder, the circulated air drops to some temperature below condensation and loses a considerable amount of water vapor. Thus, less heat is lost to the atmosphere (a drop of about 20 F instead of 65 F) for almost the same amount of water removed. Although this system controls the humidity level,

another conventional fan system controls the temperature.

**Ergonomic aspects of parlor milking.** H. W. Vos,\* Agricultural Engineering Department, Agricultural University, Mansholtlaan 12, Wageningen, The Netherlands.

Physical and mental workload as well as body posture during milking in different types of parlors were examined. The energy consumption of the milker has gradually decreased under the influence of mechanization. Advanced milking methods may require only a light-to-moderate physical effort that has reached an optimum level. The mental workload will be decreased by organizational methods and special aids that give the necessary information more easily. Batch milking, flow indicators, and occupation rates of the milker are discussed. Work posture depends on the layout of the milking parlor. Special attention has been given to pit depth, placement of barrier rail(s), controls, and displays.

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