Assessing Phosphorus Feeding on Oregon Dairies

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The importance of phosphorus (P) in reproductive performance has potentially resulted in the overfeeding of P to lactating cows. Precision feeding of P reduces P excretion, facilitates nutrient balancing and thus minimizes the potential for pollution of surface water. In 2001, the National Research Council (NRC) reduced P requirements for high producing dairy cattle from 0.41 to 0.38% (DM basis). Therefore, the objective of this study was to determine if Oregon dairy producers have adopted the new P feeding recommendations.

A field study was conducted to assess P concentrations of lactating cow diets on Oregon's dairies. Thirty-seven dairy farms, located in western Oregon, were grouped according to geographic region, valley (V) or coast (C), and herdsize, small (S) or large (L). Farms were visited on three separate occasions. During each visit, lactating diets were recorded and corresponding feed ingredients were collected and analyzed for P. For each diet recorded, fecal and urine samples were collected and analyzed for P. Herd characteristics (Table 1), management information and milk production data, when available, was obtained. When multiple lactating diets existed, each of the three variables, dietary, fecal, and urinary P, were reduced to one weighted average per visit, allowing for comparison of farms with a single lactating ration.

Average P concentration of lactating cow diets was 0.40% (DM basis) and did not differ between region or herd size (Table 1). Based on milk yield, concentration of P in diets should have been 0.34% P (NRC, 2001). Fecal P tended to be greater for V farms compared to C farms ($P = 0.08$). This trend for greater fecal P on V farms contributed to the lower calculated apparent digestibility of P for V (21.7%) compared to C (33.2%). Fecal P was similar for S and L herds. Urine P was not different between region or herd size. Calculated average annual excretion of P in manure was 24 kg/cow. Based on the amount of manure P generated, Oregon producers will need to acquire additional land in order to apply P at agronomic rates. Although P was being overfed by approximately 18%, the magnitude of overfeeding was less than reported by similar surveys in the eastern U.S. In the future, Oregon dairy producers must address overfeeding of P and implement feeding practices that met, but not exceed, P feeding recommendations.

Table 1. Characteristics of farms and concentration of P in diet, feces, and urine.

	Region		Herdsize			*P*	
Source	Coast	Valley	Small	Large	SE	Region	Herdsize
Herdsize, cows	101	278	198	800			
Milk yield (kg/d)	27.3	35.4	28.9	32.7			
Hectacres:Cow	0.69	0.43	0.43	0.22			
Diet P (% DM)	0.41	0.39	0.40	0.40	0.01	0.12	0.76
Fecal P (% DM)	0.87	0.97	0.89	0.95	0.04	0.08	0.27
Urine P (mg/dl)	2.22	2.94	2.13	3.04	0.66	0.41	0.30
P App. Digest. (%)	33.2	21.7	29.9	25.2			

Enhancing Ruminal Fermentation of the Fiber in Beef and Dairy Cow Diets by Addition of Supplemental Cobalt

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The objective of this study was to determine the intake of cobalt (Co) that optimizes fiber digestion in ruminant cattle. Four ruminally fistulated cows were fed a high forage diet [50 % bluegrass straw (BGS) and 50% oat hay (OH)] in Trial 1 and a dairy-type diet [68% haylage and 32% corn] in Trial 2. In both trials, treatments were arranged in a Latin square design. A right-handed Latin square arrangement of treatments was used to avoid carry-over effects. Treatments were trace element salt that contained 0, .5, 1, 2, 4, 8 and 10 ppm of added Co. The Co concentrations were achieved by adding cobalt glucoheptonate to a basal mineralized salt. Cows were adapted to each treatment for 7 d; ruminal fluid was collected (4 h after feeding) and transported to the laboratory to be used as an inoculant for the Daisy Incubator (ANKOM Technology). Duplicate incubations from each cow at each Co level were conducted. To examine dry matter and fiber digestion, the forage used in the diet was collected, dried at 60 C, ground through a 1 mm screen, weighed into small bags and placed into the incubator. Ground alfalfa hay (AH) was used as a reference standard. After 48 h, the incubation was ended; the bags were washed and dried at 100^{o} C for 4 h to determine dry matter disappearance (DMD). The content of neutral detergent fiber (NDF) and acid detergent fiber (ADF) in the dry residue was determined. Salt was fed free choice in Trial 1, and in Trial 2 the cows were fed 100g per day of the designated salt. Cobalt concentration in ruminal fluid was determined using neutron activation.

In Trial 1, the AH DM was degraded to the greatest extent ($P>.0001$) and there was no difference in degradation of BGS and OH (58 %, 53 % and 52 %, respectively). However, degradation of AH NDF and ADF was lower than the other forages ($P>.0001$). Cobalt level in the salt had no effect on degradation of DM, NDF or ADF for any feedstuff incubated. When DM, NDF and ADF disappearance was regressed against ruminal Co concentration across all salt levels there was no relationship for any feedstuff. Salt was supplied free choice in Trial 1 and intakes were extremely variable by cow. Ruminal Co concentrations rarely exceeded 0.25 ppm despite salt Co concentration. These data indicate that Co supplementation of a free choice salt mix does not alter DM or fiber digestion.

In Trial 2, the two forages tested were AH and OH. Alfalfa DM disappeared to a greater extent ($P<.0001$) than the OH, 61.5 % and 47.7 %, respectively. Digestibilities *in vitro* of NDF and ADF were greater for the OH than the AH ($P<.10$). There was no effect of supplemental Co on DMD, NDFD, or ADFD for either forage. Regression of neither AH nor OH DM, NDF or ADF disappearance against ruminal cobalt concentrations indicated a statistical relationship. In Trial 2, ruminal Co concentrations rarely exceeded 0.4 ppm regardless of salt Co concentration. These data confirm that Co supplementation of salt does not impact *in vitro* DM or fiber digestion.

Feeding Behaviour as an Early Predictor of Metritis in the Post-Parturient Dairy Cow

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It is well known that severely ill animals can show a decline in feed intake, but there is little evidence that reduced intake can be used to predict the onset of disease. Metritis is a common disease affecting dairy cows during the post-parturient period. Cows suffering from metritis may exhibit reduced milk yield and compromised reproductive performance. The objective of this experiment was to determine if feeding behaviour pre-parturition could be used to predict the occurrence of metritis in the post-parturient dairy cow. Seven heifers and 16 Holstein cows (parity=1.6±0.7) were fitted with a passive transponder that allowed us to automatically monitor the frequency and duration of visits to the feed alley using a computerized monitoring system that recorded cow presence (a 'hit') every 6 s. Feeding behaviour was monitored during the transition period beginning two weeks before and ending three weeks after calving, with the exception of the day prior to calving, the day of calving and the day following calving. After calving, metritis was diagnosed by rectal body temperature (measured daily) and examination of vaginal discharge (measured every three to five days). Over the three weeks of observations, 70% of cows were diagnosed with some signs of metritis. On average, animals that were diagnosed with metritis recorded 397 fewer hits/day during the transition period than did the healthy cows (see Figure 1, P=0.006). Moreover, this difference in feeding time could be detected even one week before calving (P=0.02), illustrating that feeding behaviour can be used as an early predictor of which cows are at risk for metritis.

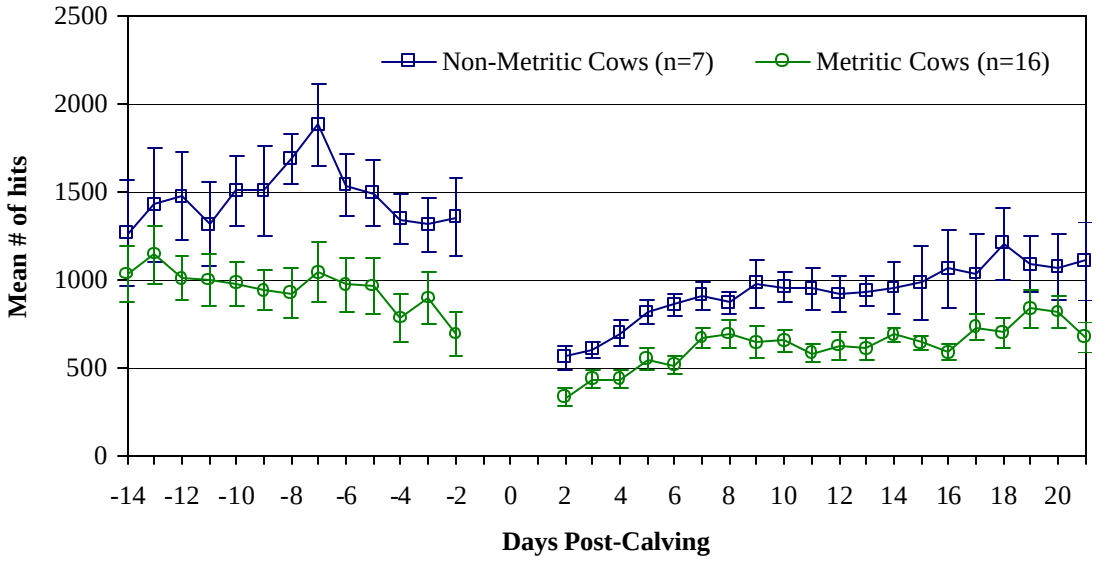

Figure 1. Daily feeding behaviour activity (±SE) of metritic and non-metritic cows in transition.