Health and Production Characteristics for a Dynamic Feeding Model

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In AMS cows are fed and milked individually thereby providing the opportunity that concentrates allocation and milk interval could be set individually. André *et al.* (2009) developed an adaptive model to determine the individual milk yield response on concentrates and milk interval. This dynamic feeding and milking model (DLM) was implemented in the Lely T4C management program (Lely Industries N.V., Maassluis, the Netherlands). Today's concentrate allocation and milk interval settings are provided by yesterday's process data, which was analyzed with a dynamic linear model to make accurate estimates. That way inter and intra individual variation existing in cows' behavior and performance is taken into account when calculating new settings. The control model strives for the most efficient robot performance and optimum feed to the individual productive requirements (André *et al.* 2009). Based on the daily individual optimal settings the balance between milk returns and concentrate costs is maximized.

Health and production characteristics associated with the dynamic model are assumed to be beneficial for the farmers economic as well as for the cow's health. Although a positive economic effect was shown, it is still unknown how animal health and production are affected. Therefore, the aim of this study is to compare health and production characteristics of cows fed according to dynamic feeding with their control herd mates.

Materials and Methods

The dynamic feeding model was installed on two farms in august 2009 and runs for 3 months now. Half of the cows were under control of the dynamic feeding model, the other half of the herd continued to be fed according to the farm's regular settings (fixed feeding and feeding according to milk table, respectively). Animals received a basic ration at the feed fence consisting of grass silage, corn silage, hay and brewery grains. In addition, between 2-8 kg/4.4-17.6 lbs of concentrates were fed in the milking robot. Concentrates were a protein rich corrector type (CC) and a balanced production type (PC) used for dynamic feeding. Cows were matched according to parity and date of calving and allocated at random to the DLM (D) or control (C) group. From T4C following data were collected for analysis: milk yield, bodyweight, robot visit behavior (milkings, refusals, milk yield per milking), total and rest amount of PC and CC concentrates, health records, and once every 4 weeks body condition was scored on a 5-point scale (Edmonson *et al.* 1989). Data were analyzed using linear mixed models in a repeated measurement design, after log-transformation for normality reasons. Data are presented as mean ± SEM and values of $P < 0.05$ were considered statistically significant.

Results and Discussion

Daily milk yield and yield per milking did not differ between D and C groups (19.2 ± 0.8 kg/42.2 ± 1.8 lbs versus 22.2 ± 0.6 kg/48.8 ± 1.3 lbs and 8.2 ± 0.3 kg/18.3 ± 0.7 lbs versus 9.2 ± 0.2 kg/20.2 ± 0.4 lbs respectively), although cows in the C group had significantly more milkings (2.4 ± 0.1 versus 2.2 ± 0.1) and refusals (4.7 ± 0.4 versus 3.8 ± 0.4) than cows in the D group. The low

daily milk yield and the lower average number of milkings in this study can be attributed to the fact that average lactation days of both D and C groups were over 260. Hence, based on a minimal yield per milking, cows are limited by the T4C management system to be milked a certain number of times/day, with a minimum of 2. The average lactation stage of cows in our trial may also explain why no clear effect on milk yield was observed. When using dynamic feeding, the model strives to especially lower peak milk yields, resulting in a flat and more persistent milk yield profile (André *et al.* 2009). Consequently it is assumed the health risks associated with high productions will be less.

In the DLM group, cows consumed significantly less PC and CC concentrates, compared to the control group (Figure 1). The difference was 1.1 kg/2.4 lbs and 0.26 kg/0.57 lbs respectively. Taking into account the concentrate price of 20 €/100 kg-220 lbs used, for an average cow of 9000 kg/19800 lbs of milk/year this equates to a saving of 122 €/year. The decreased amount of concentrate needed without a milk yield decrease indicates a better efficiency in roughage utilization. No differences were observed in rest feed of the concentrates.

Bodyweight and body condition scores remained stable throughout the trial period and no significant differences were observed in body condition score between test- and control groups. Neither was there any differences concerning the incidence of mastitis, lameness or other diseases.

In conclusion it can be stated that dynamic feeding enables farmers to feed their cows according to individual needs and efficiency, resulting in an increased milk return per cow, without any adverse effects on production, robot visit behavior or health.

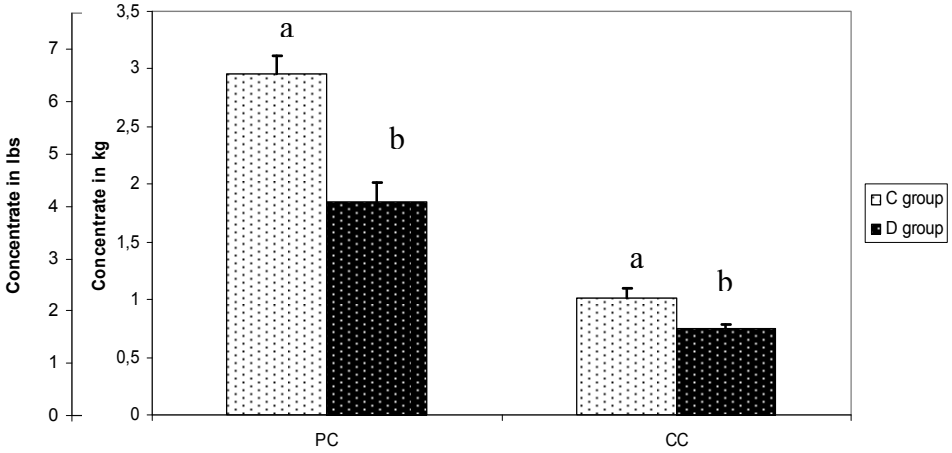

Figure 1: Consumption of production (PC) and corrector (CC) concentrates by control (C) and DLM (D) groups (mean ± SEM). [a,b] Bars with different superscripts within concentrate type differ significantly ($P<0.05$).

References

André, G., E.J.B. Bleumer and G. van Duinkerken. 2009. Evaluation of an Application for Dynamic Feeding of Dairy Cows. Proc. Precision Livestock Farming '09. Wageningen Publishers, the Netherlands, pp 25-32.

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