

## IMPACTS OF FEEDING SYSTEM AND SEASON ON MILK COMPOSITION AND CHEDDAR CHEESE YIELD IN A SUB-TROPICAL ENVIRONMENT

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Several factors affect milk composition, particularly protein content, which has a major influence on the processing quality of milk for the manufacture of cheese. These factors include season, stage of lactation and feeding system (White 2001). Low milk protein occurs in south-east Queensland during spring and summer when forage quality is poorest (Barber *et al.* 2001). This results in reduced cheese yield efficiency; a 0.1% reduction in casein concentration reduces Cheddar cheese yield potential by 0.5 kg/100 kg milk (Amenu *et al.* 2003). In this study, 2 feeding systems, a rain-grown tropical grass system and a feedlot, were compared for milk composition, processability and Cheddar cheese yield efficiency.

Holstein-Friesian cows (16 matched pairs) were used in a 2 x 2 factorial experiment (2 feeding systems, a tropical grass system (M1) and a feedlot system (M5), and 2 seasons, autumn and spring) with 4 replicates. The M1 system consisted of oats and Rhodes grass, with hay and silage given as required, and the M5 system consisted of maize/barley and lucerne. Cows in both systems received the same commercial concentrate at ~3 t /head/year. Green pasture supplied only about 1 kg DM/head/day as a consequence of continuous drought. Total DM (kg/cow/day), crude protein (kg/cow/day) and metabolisable energy (MJ/cow/day) intakes were 17.0, 2.7, and 187, for M1, and 24.0, 4.0, 260 for M5, respectively.

The M5 cows produced more milk with higher true protein and total casein than M1 cows (P<0.01; Table 1). Milk total solids, ash, individual caseins as proportions of total casein (results not shown), Cheddar cheese yield and yield efficiency were similar (P>0.05). The cows produced more milk, but of inferior composition, in spring than in autumn, and cheese yields were lower in spring.

**Table 1. Effects of feeding system (M1 – a tropical grass system; M5 – a feedlot system) and season on milk yield, composition and Cheddar cheese yield**

| Feeding system | Season | Milk yield (L/cow/d) | Milk composition (g/100 g) |              |              |           | Cheese yield (kg/100 kg milk) |             |                |
|----------------|--------|----------------------|----------------------------|--------------|--------------|-----------|-------------------------------|-------------|----------------|
|                |        |                      | Total solids               | True protein | Total casein | Total ash | Actual                        | Theoretical | Efficiency (%) |
| M1             | Autumn | 17.5                 | 13.9                       | 3.5          | 2.9          | 0.76      | 12.8                          | 12.7        | 100.1          |
|                | Spring | 27.3                 | 12.2                       | 2.6          | 2.1          | 0.70      | 10.0                          | 10.0        | 100.0          |
| M5             | Autumn | 27.8                 | 14.1                       | 3.7          | 3.1          | 0.74      | 12.8                          | 12.8        | 99.6           |
|                | Spring | 33.2                 | 12.7                       | 3.1          | 2.5          | 0.74      | 10.5                          | 10.5        | 100.1          |
| Significance   | Season | **                   | **                         | **           | **           | ns        | *                             | *           | ns             |
|                | System | **                   | ns                         | **           | **           | ns        | ns                            | ns          | ns             |

Significance: \*\* (P<0.01), \* (P<0.05), ns not significant

The results indicate that milk yield and protein content were influenced by the season of production and the feeding system, while only the season affected yield of Cheddar cheese, largely reflecting milk total solids levels. It was concluded that intensive tropical pasture systems can produce milk suitable for Cheddar cheese manufacture when cows are supplemented with high-energy concentrates. However, the season of production appears to have a greater effect than the feeding system.

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