Interactions between feeding strategies and optimal culling and insemination policies in dairy herds

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SLOW

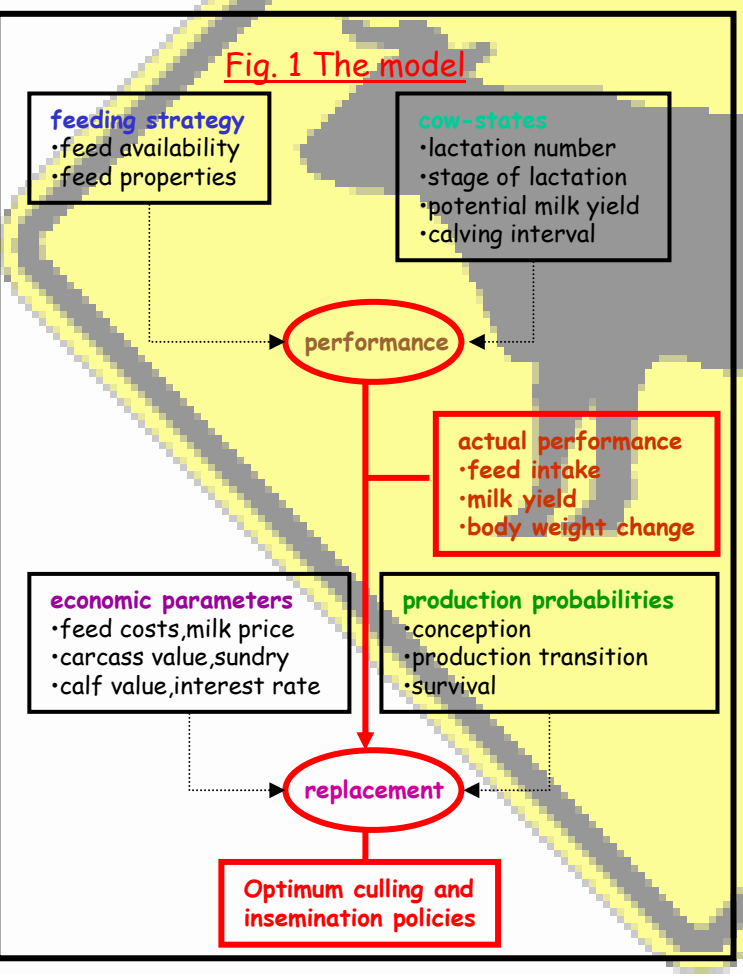
Objective: To develop a model to determine the impact of feeding strategy on optimal replacement and insemination policies in dairy herds.

The model (Fig 1):

•The first section: **performance** model, combines **feeding strategy** of the farm and potential performance of cows (defined by **cow-states**) to provide estimates of **actual performance**.

•The second section: **replacement** model, combines **actual performance**, **economic parameters** and **production probabilities**, to find **optimum culling and insemination policies** by making use of dynamic programming.

Fig. 1 The model



Results:

•Actual performance equals potential performance only when nutrients are supplied in adequate quantity and quality by the diet, and the cow is physically able to consume these nutrients (Fig. 2).

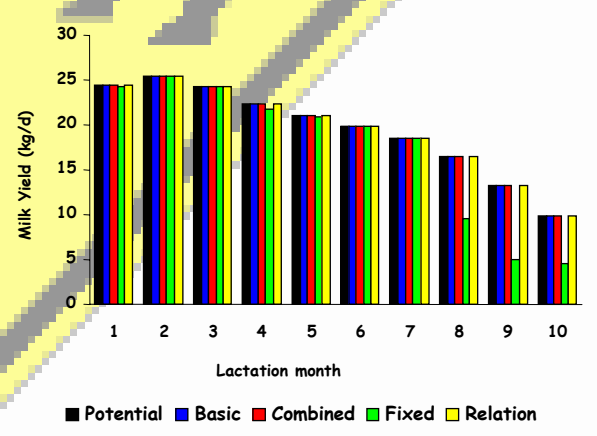
•Feeding strategies have an effect on average herd-life, replacement rate, days to culling after calving and profitability of cows (Table 1).

Table 1. Parameters describing optimal culling and insemination policies for a herd of a fixed size according to feeding strategy.

Parameter	Feeding Strategy[1]			
	BASIC	COMBINED	FIXED	RELATION
Herd-life (mo)	64.1	63.4	67.4	63.8
Calving Interval (mo)	370.3	369.4	368.7	369.9
Voluntary replacement (%)	8.5	8.8	7.2	8.3
Involuntary replacement(%)	10.2	10.1	10.6	10.5
Days to culling (after calving)	247.5	217.0	220.0	218.9
Monthly income (US$/cow)	55.7	59.1	48.2	59.6

[1]Different for stages 0-100, 101-200 and >200 d in lactation.
Basic: Milk-concentrate (MC) ratio 2:1,3:1 and 4:1.
Combined: MC ratios 3:1,3:1 and fixed ratio 3 kg.
Fixed: 6,4,4 kg fixed ratios.
Relation: MC ratio 4:1 all stages.
All cows grazing kikuyu grass (pennisetum clandestinum)

Fig. 2 Actual vs. potential milk yield for an average cow



CAUTION

Conclusion: The model provides an efficient tool to study the interactions between nutrition, reproduction and breeding at the animal and herd level, and their effect on farm profitability.