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Review Article

IMPORTANCE OF PROTEIN ON REPRODUCTION IN DAIRY CATTLE

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Abstract: The dietary crude protein requirement for high producing dairy cattle (30 to 50 kg milk/d) ranges from 14 to 22% of dietary DM. The concentration of protein needed in the diet of cows can be expected to increase in the future as management technology and genetic selection further enhance milk producing ability. Protein can increase milk yield by providing more amino acids, by increasing available energy, and by altering efficiency of utilization of absorbed nutrients.

INTRODUCTION

Cows fed excess protein (more than 10-15% above requirements) required more services per conception and had longer calving intervals. Overfeeding protein should be discouraged as it is a economic loss to the farm. Urea is added to some dairy rations as a source of nitrogen which the rumen bacteria can convert into protein. Effective utilization of urea occurred when readily available carbohydrate are fed. When discussing the effect of dietary protein on fertility in dairy cows it is first necessary to differentiate between rumen degradable protein (RDP), which is essentially ingested feed protein that is degraded to ammonia (and other non-protein nitrogen products) in the rumen, and metabolisable protein (MP), which is essentially the amino acids absorbed from the small intestine. 15-19% CP lower conception rate from 65 to 53 % (Thatcher *et al*., 2001).

Relationship between crude protein (CP) level, conception rate and blood urea nitrogen (BUN)

	13-14% CP		**15-19% CP**	
	Conception %	**BUN (mg/dl)**	**Conception %**	**BUN (mg/dl)**
Folman *et al.,* 1981	56	8.8	44	15.4
Kaim *et al*., 1983	57	9	43	17
Howard *et al*., 1987	87	15	85	26
Carroll *et al*., 1988	64	11	56	24

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Canfield *et al*., 1990	48	12	31	19
Elrod and Butler, 1993	83	<16	62	>16
Average	62	13.8	48	21.3

Metabolisable protein has two origins: the truly digestible amino acids in microbes from the rumen (microbial protein) and the truly digestible amino acids in feed protein that has bypassed the rumen, or rumen undegraded protein (RUP). It is necessary to make this distinction as the balance (dietary supply relative to requirement) of these different protein fractions may have different effects on fertility. There is quite a large volume of published research, which indicates that feeding excess RDP has a negative effect on fertility (Tamminga, 2006). Tamminga (2006) clearly states that feeding high levels of RDP delays the first ovulation or oestrus, reduces the conception rate to first insemination, increases the number of days open and lowers the overall conception rate. There are several proposed mechanisms for this effect including an exacerbated NEB for cows fed diets high in RDP in comparison to diets high in RUP (Westwood *et al*., 2000) and proven deleterious effects of both ammonia and urea on both oocyte and embryo development (Ocon and Hansen, 2003; Rhoads *et al*., 2006). However, this deleterious effect of excess RDP ingestion may be absent in beef heifers, which are normally in positive energy balance at breeding (Diskin *et al*., 2006). Dietary excesses of MP are thought to be of lesser consequence than excesses of RDP in terms of dairy cow fertility, excess MP supply relative to requirement will often increase milk yield and exacerbate NEB. Hence supply relatively low amounts of MP, in order to reduce milk yield response to energy supplementation and thus improve energy balance.

Effect of protein on progesterone concentration

Control	Progesterone level (ng/ml)
Control	3.8
13% protein	6.5
22% protein	2.5

CONCLUSION

Balance the ration for crude protein according to level of milk production. For high producing and early lactation cows 35% of the crude protein should be undegradable protein.

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