Feeding with badly preserved silages and occurrence of subclinical ketosis in dairy cows

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Introduction Ketosis in dairy cows is due to high levels of circulating ketone bodies in blood (Duffiel, 2000). In early lactation, the capacity of voluntary dry matter intake does not allow dairy cows to cover the total energy requirements for maintenance and production, and then the body reserves are mobilised. However, the amounts of fatty acids that can be metabolised in the liver are limited, later they are converted to ketone bodies (Tveit *et al.,* 1992). During forage ensiling, acetic and lactic fermentations only are desirable, but frequently butyric and alcoholic fermentations appear. When the animals ingest these silages, the butyric acid is metabolised to ketone bodies (Chalupa, 1974). The ketosis problems could be due to both causes simultaneously. The objective of this paper was to establish the incidence of subclinical ketosis in dairy herds of Asturias (Spain) and its relationship with the nutritive and fermentative characteristics of silages used in the ration.

Materials and methods Twenty representative dairy herds were recorded over a 12-month period. Monthly, the feeding was recorded and samples of total ration and its components were taken. Simultaneously, the urine of all cows that were between the previous month of parturition and three months later was sampled to determine the incidence of subclinical ketosis. The proximate analyses of feed samples were determined by techniques proposed by Wende (AOAC, 1984) and Van Soest *et al.* (1991). The volatile fatty acid concentration was determined by HPLC. The urine ketone bodies level was determined immediately with quantitative test strips.

Results A total of 2831 urine samples were taken from 1112 dairy cows. Of the total, 79.94% did not show a detectable excretion of ketone bodies by urine, whereas 11.18% presented slight subclinical ketosis and 5.14% and 3.74% presented moderate and high levels of excretion (Figure 1). The metabolisable energy content of the diet in the four levels of ketone bodies excretion was similar (10.73 ±0.141 MJ ME/kg DM). However, the concentration of butyric acid in the diet was significantly higher in the animals with subclinical ketosis (P<0.001, Figure 2).

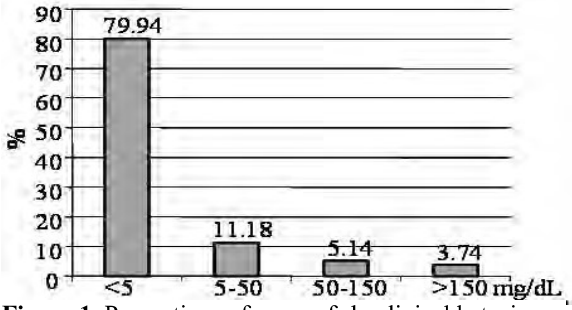

Figure 1 Proportions of cases of sbuclinical ketosis according to content in ketone bodies in urine

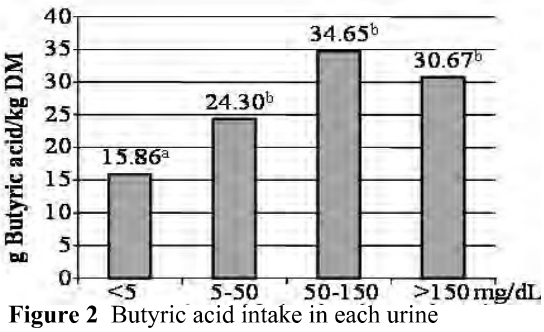

Figure 2 Butyric acid intake in each urine ketone bodies excretion

Conclusions The analysis of frequencies in which the positive cases appear indicates that the probability of subclinical ketosis in cows is higher when they are feeding a ration elaborated with silages with high butyric acid content. A low energy concentration of the ration (<10.5 MJ ME/kg DM), does not imply a higher probability of ketosis incidence, because, in our study, the distribution of positive cases are not related with that. However, the incidence in our cases can be further reduced by the use of maize silage well preserved as an energy supplement.

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