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Relationship between palatability and rate of intake in goats

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SUMMARY - To know whether diet palatability or feed preferences can influence the rate of intake (RI) or not in ruminants. Twelve lactating goats received a complete diet (45% DM) composed of 72% DM dehydrated lucerne, 13% pressed beet pulps and 15% cereals in two experiments. In each experiment, NaCl was added: 0%, 2% and 4% to experimental diets. The palatability of diets was estimated by the method defined by Morand-Fehr and Hervieu (1993) by testing two feeds or diets in cafeteria tests. The results were the following: Exp A, RI (g/mn) between 0 and 10 mn (RI10): 85^a (0% NaCl), 60^b (2%), 40^b (4%); RI between 10 and 30 mn (RI30): 47^a (0%), 26^b (2%), 14^c (4%); palatability (average intake in tests) (g/test): 183^a (0%), 127^b (2%), 77^c (4%); Exp B, RI10: 80^a (0%), 52^b (2%), 42^b (4%); RI30: 40^a (0%), 29^b (2%), 12^b (4%); palatability: 175^a (0%), 92^b (2%), 38^c (4%). The results suggest that a taste variation without modification of physical presentation of diets as an increase of NaCl added to diets can modify RI in goats, and consequently the palatability of diets can influence the rate of intake very strongly.

Key words: Goats, feeding behaviour, rate of intake, palatability.

RESUME - "Relation entre la palatabilité et le taux d'ingestion chez les caprins". Afin de connaître si la palatabilité du régime ou les préférences alimentaires peuvent influencer ou non le taux d'ingestion (TI) chez les ruminants, douze chèvres en lactation ont reçu un régime complet (45% MS) composé de 72% MS de luzerne déshydratée, 13% de pulpe de betterave pressée et 15% de céréales, dans deux expériences. Dans chaque expérience, on ajoutait du NaCl : 0%, 2% et 4% dans les régimes expérimentaux. La palatabilité des régimes a été estimée par la méthode définie par Morand-Fehr et Hervieu (1993) en testant deux aliments ou régimes dans des tests type cafétéria. Les résultats ont été les suivants : Exp A, TI (g/mn) entre 0 et 10 mn (TI10) : 85^a (0% NaCl), 60^b (2%), 40^b (4%) ; TI entre 10 et 30 mn (TI30) : 47^a (0%), 26^b (2%), 14^c (4%) ; palatabilité (ingestion moyenne dans les tests) (g/test) : 183^a (0%), 127^b (2%), 77^c (4%) ; Exp B, TI10 : 80^a (0%), 52^b (2%), 42^b (4%) ; TI30 : 40^a (0%), 29^b (2%), 12^b (4%) ; palatabilité : 175^a (0%), 92^b (2%), 38^c (4%). Les résultats suggèrent qu'une variation du goût sans modification de la présentation physique des régimes, telle qu'une augmentation du NaCl ajouté au régime, peut modifier le taux d'ingestion chez les chèvres, et par conséquent, la palatabilité des régimes peut influencer très fortement le taux d'ingestion.

Mots-clés : Caprins, comportement alimentaire, taux d'ingestion, palatabilité.

Introduction

In ruminants, it is important to show the ingestibility of feeds particularly forages, in the quantities ingested of each feed in standard conditions. Indeed some authors suggested that the ingestibility of feeds can be linked to their palatability (Faverdin, 1985). As in cows and sheep, it was observed that positive correlations were observed between ingestibility and rate of intake (Baumont *et al.*, 1990; Baumont, 1996), the purpose of this experiment carried out in goats is to study the relation between the rate of intake and palatability of feeds with different NaCl content.

Two experiments (Exp 1, 2) were carried out with twelve Alpine or Saanen goats, 2 years or more old and between 3rd and 6th month of lactation. Each experiment was composed of one trial (3 periods of one week) where intake characteristics were recorded and a series of cafeteria tests during 3 days where diet palatability was estimated. In each trial, goats received three experimental diets successively during three weeks in a Latin square design.

Materials and methods

All the diets were complete diets (50-55% DM) composed of dehydrated lucerne (unground), overpressed beet pulp silage and concentrates. The composition of diets is reported in Table 1. In experiment 1 and 2, concentrates had the same composition (mixtures of cereals and soya oilcake). The NaCl contents were different in diets A, B and C; the level of NaCl in diets B and C were relatively high to modify their palatability. In experiments 1 and 2, goats were given water *ad libitum*.

The palatability tests on goats were established by Morand-Fehr and Hervieu (1993). Tests took place at 11.00 a.m. when goats were moderately hungry, four hours after the distribution of the late meal. Four boxes containing 200 g complete feed were presented to each goat during four times 30 s by opening and closing trough shutters. Two boxes contained Feed 1 and the two other ones containing Feed 2. The position of boxes in the trough changed at each trough opening. The test was carried out by testing 2 feeds simultaneously. A series of tests compared all the possible couples of feeds (for 3 experimental feeds, 3 possible couples). The relative palatability of a feed was the average quantity ingested in all the tests where this feed was present.

Table 1. Composition of diets (% DM) (Exp 1 and 2)

	Diets		
	A	B	C
Dehydrated lucerne (DL)	47.4	46.3	45.4
Overpressed beet pulps silage (BP)	30.5	30.0	29.3
Concentrate (CO)	22.1	21.7	21.3
NaCl	0	2.0	4.0

Results

The increase of NaCl content in diets significantly reduced the rate of intake, the quantity ingested during a meal and diet palatability (Table 2). The decrease of the intake due to the NaCl content in the diet resulted more from a slower ingestion than a shorter meal duration.

Table 2. Effect of NaCl content in diets on the characteristics of intake in dairy goats (Exp 1 and 2)

		Diets		
		A	B	C
Rate of intake (g/mn)				
0-10 mn	Exp 1	85 ^a	60 ^b	41 ^b
	Exp 2	81 ^a	52 ^b	42 ^b
10-30 mn	Exp 1	47 ^a	26 ^b	14 ^c
	Exp 2	41 ^a	20 ^b	12 ^b
Intake during a meal (kg)				
	Exp 1	2.19 ^a	1.33 ^b	0.78 ^c
	Exp 2	1.99 ^a	1.13 ^b	0.76 ^c
Duration of meals (mn)				
	Exp 1	52 ^a	63 ^a	61 ^a
	Exp 2	47 ^a	56 ^a	51 ^a
Palatability (g) (cafeteria tests)				
	Exp 1	183 ^a	128 ^b	77 ^b
	Exp 2	175 ^a	93 ^b	38 ^c

a,b,c: In the same line, two values in different subscripts are significantly different $P \leq 0.05$

The correlations between the palatability and rate of intake or the quantity ingested during a meal were highly significant (Table 3). But the correlation between the palatability and duration of meal was not significant.

Table 3. Relationship between palatability of diets and characteristics of intake in dairy goats (Exp 1 and 2)

Variables		Coefficient of correlation	Equation
y	x		
RI 0-10 mn	Palatability	r = 0.97+++	y = 0.26 x -2.78
RI 10-30 mn	Palatability	r = 0.97+++	y = 0.37 x +20.2
Total intake per meal	Palatability	r = 0.97+++	y = 11.4 x +1.39
Duration of meal	Palatability	r = 0.34 NS	

Conclusions

A factor that modifies the palatability of feeds as NaCl content in diets can reduce the quantity ingested during a meal by slowing down the rate of intake. Consequently a low level of intake can be due a too weak palatability of feeds. But we know that it is not true in all the cases, particularly when the decrease of palatability is due to a slow size of feed particles (Ben Ayed *et al.*, 1996).

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