

FEEDING BEHAVIOR OF PYGMY GOATS DURING WATER DEPRIVATION

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Introduction

Water deprivation depresses food intake in ruminants (Bianca, 1966). The mechanism of this effect is unknown. The present study addressed this open question by characterizing the anorexia during water deprivation in pygmy goats. In this context, plasma levels of the neurohypophyseal hormone vasopressin (VP) were also measured, because plasma VP is known to increase during water deprivation (Robertson, 1977) and because low doses of VP decreased food intake after intraperitoneal injection in goats (Meyer, 1988).

Materials and Methods

Eight adult, female, non-lactating pygmy goats (29-37 kg body weight) were housed individually in a room which was kept on an artificial dark-light cycle of 12 h each. The goats were offered hay and concentrate (UFA 865, Volg Winterthur) ad libitum in separate, spill-resistant food containers. Water deprivation started at light onset and lasted 72 h. Food intake data were obtained by continuous automatic recording of the weight of

the food containers (Langhans et al., 1988) for 7 days, starting 48 h before water deprivation. In an additional experiment, blood was collected under similar conditions just before the 72 h water deprivation period and at the end of it as well as 24 h after rehydration. Plasma vasopressin (VP) was measured using a commercial RIA (Vasopressin Rapid, Bühlmann Laboratories AG, Basel).

Results

Tables 1 and 2 show the feeding data of the 3 water deprivation days and of the last pre-deprivation day. Water deprivation caused a successive decline in both, hay and concentrate intake (table 1). However, concentrate intake decreased earlier and relatively more than hay intake (table 1). The inhibition of feeding was primarily due to a reduction in meal size (table 2). Meal frequency was not significantly reduced except for concentrate during the dark phase of the last water deprivation day (table 2). In general, duration of concentrate meals seemed to be also reduced (table 2), however, the respective differences did not reach statistical significance. All feeding parameters rapidly

TABLE 1. EFFECT OF WATER DEPRIVATION ON FOOD INTAKE

Condition Day	Water ad lib.		No water		No water		No water	
	0		1		2		3	
Food intake (g)	24 h		24 h		24 h		24 h	
Concentrate	175±35		115±30		79±14 [†]		58±18 [†]	
Hay	304±41*		291±33*		260±38*		180±30* [†]	
Food intake (g)	light	dark	light	dark	light	dark	light	dark
Concentrate	75±22	101±17	74±20	41±11 [†]	48±14 [†]	32±7 [†]	31±8 [†]	17±10 [†]
Hay	260±35*	44±15*	268±33*	23±11	240±37*	21±7	163±29* [†]	18±8

All values are means ± SEM of the 8 goats' individual values.

*Value is significantly ($p < 0.05$) different from corresponding concentrate value.

[†]Value is significantly ($p < 0.05$) different from the respective control value on day 0.

TABLE 2. EFFECT OF WATER DEPRIVATION ON MEAL PATTERN

Condition Day	Water ad lib.		No water		No water		No water	
	0		1		2		3	
	light	dark	light	dark	light	dark	light	dark
Meal size (g)								
Concentrate	23±6	38±7	19±5	27±9	9±2 ⁺	21±4 ⁺	12±4 ⁺	22±5
Hay	30±9	33±11	29±11	25±10	25±6*	17±6	22±5*	19±8
Meal duration (min)								
Concentrate	38±27	35±23	17±9	47±27	18±10	11±8	47±24	12±8
Hay	24±7	26±10	26±8	37±14	25±7	15±5	33±10	19±8
Meal frequency								
Concentrate	3.0±0.9	2.6±0.3	3.5±0.8	1.5±0.3	3.8±0.9	1.6±0.4	2.3±0.6	1.1±0.3 ⁺
Hay	8.3±1.0*	1.6±0.3*	8.5±0.7*	1.4±0.5	9.0±1.3*	1.3±0.4	7.1±0.8*	0.9±0.3

All values are means±SEM of the 8 goats' individual values.

*Value is significantly ($p < 0.05$) different from corresponding concentrate value.

⁺Value is significantly ($p < 0.05$) different from the respective control value on day 0.

approached baseline values after rehydration (not shown). Interestingly, goats preferred hay during the light but concentrate during the dark phase of the lighting cycle under control conditions (day 0, tables 1 and 2). Plasma VP increased from 11 ± 1 to 105 ± 28 pg/ml ($x \pm$ SEM, $p < 0.05$) during water deprivation and was 17 ± 3 pg/ml at 24 h after rehydration.

Discussion

The results indicate that water deprivation affects primarily the mechanism that terminates meals. Since concentrate meals were apparently more affected than hay meals, an abnormal increase in rumen osmolality during feeding (Ternouth and Beattie, 1971) may contribute to the anorectic effect of water deprivation. In contrast, the observed increase in plasma VP (roughly 10-fold) is probably not involved in the anorectic effect of water deprivation because a dose of a V_1 -receptor antagonist which blocked the anorectic effect of exogenous VP, did not affect feeding in water deprived goats (Meyer, 1988). The circadian changes in the preference for hay versus con-

centrate suggest that different factors contribute to the regulation of hay and concentrate intake in goats during night and day. This is in line with previous findings (Langhans et al., 1988) and merits further attention.

(Key Words: Feeding Behavior, Water Deprivation, Vasopressin)

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