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Concentrations of adiponectin, leptin, ghrelin and resistin in goat colostrum and mature milk from seven breeds

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Application The present study found that adiponectin, leptin, resistin and ghrelin hormones are secreted biologically in goat colostrum and milk. Further studies will assess their relationships with fat metabolism and immune system development.

Introduction The importance of passive or humoral immunity, through absorption of colostrum antibodies or immunoglobulin is well recognised. White adipose tissue, considered a passive site of lipid storage, is reported to have a role in metabolic and endocrine functions; secreting a range of hormones known as adipokines such as adiponectin, leptin, ghrelin and resistin (Hussein *et al.*, 2015). In addition, these major adipokines have been found in human milk and in some livestock species (Guzel *et al.*, 2017). There is a paucity of literature regarding hormones that may be associated with energy metabolism in goats, thus the objective of this study was to measure the concentration of adiponectin, leptin, ghrelin and resistin in goat colostrum and mature milk from seven different breeds.

Material and methods Seventy colostrum and milk samples were obtained from seven goat breeds (n=10 goats per breed); (Majorera (MAJ), Palmera (PAL), Tinerfeña (TNF), Del Guadarrama (GU), Florida (FL), Payoya (PY) and Verata (VE)). The goats' diet was fed according to INRA recommendations and was balanced for energy and protein levels. Colostrum samples (50 mL) were collected immediately post-partum (PP) and milk samples (50 mL) were collected on day 30 PP. Each sample was divided into four aliquots. All aliquots were preserved by freezing at -20°C until analysis. Hormonal concentrations were determined in skimmed colostrum and milk. Skimming was performed by centrifugation at 4600 rpm, 10 minutes, 4°C. Colostrum and milk hormone concentrations were measured using commercially available ELISA kits (Leptin and adiponectin (Cusabio Biotech kits); Resistin and ghrelin (MyBioSource kits). Samples were analysed in duplicate. Statistical analysis was performed using SAS, Version 9.4 (SAS Institute Inc., Cary, NC). The PROC MIXED procedure of SAS with repeated measures was used to evaluate the concentration of hormones in colostrum and milk.

Results A breed effect was found for all hormones except milk ghrelin concentration (Table 1). Leptin concentration was greater in milk, and in colostrum, for the GU and PY, respectively, with no differences between colostrum and milk concentration for the other breeds. Adiponectin concentration was greater in colostrum than in milk for all breeds except for the PY breed. Ghrelin concentrations were greater in colostrum than in milk for the PAL, TNF and VE breeds. Resistin concentration was greater in milk than in colostrum for GU, PY and VE breeds.

Table 1 Leptin, adiponectin, ghrelin and resistin concentration in colostrum and milk (day 30 PP) from seven goat breeds¹

Breed	Leptin (ng/ml)			Adiponectin (µg/ml)			Ghrelin (ng/ml)			Resistin (ng/ml)		
	C	M	SEM	C	M	SEM	C	M	SEM	C	M	SEM
MAJ	0.83 ^a	0.07 ^a	0.29	73.80 ^{x,b}	11.06 ^{y,b}	8.20	0.10 ^a	0.07	0.01	26.99 ^{ab}	23.68 ^{ab}	1.60
PAL	0.47 ^a	0.10 ^a	0.14	82.20 ^{x,b}	11.02 ^{y,b}	2.59	0.10 ^{x,a}	0.06 ^y	0.01	18.36 ^a	24.68 ^{abc}	2.53
TNF	1.17 ^a	1.19 ^b	0.07	175.71 ^{x,c}	7.53 ^{y,ab}	4.40	0.17 ^{x,ab}	0.07 ^y	0.01	41.27 ^b	25.22 ^{abc}	5.93
GU	0.98 ^{x,a}	1.20 ^{y,b}	0.03	8.38 ^{x,a}	4.29 ^{y,a}	1.20	0.14 ^{ab}	0.16	0.01	16.77 ^{x,a}	26.23 ^{y,abc}	2.00
FL	4.72 ^b	1.10 ^b	1.37	123.03 ^{x,bc}	9.27 ^{y,b}	20.32	0.17 ^{ab}	0.13	0.05	38.77 ^b	35.08 ^c	3.18
PY	2.22 ^{x,ab}	1.11 ^{y,b}	0.33	11.38 ^a	9.29 ^b	1.06	0.16 ^{ab}	0.14	0.01	16.20 ^{x,a}	23.10 ^{y,a}	1.79
VE	0.42 ^a	0.09 ^a	0.12	79.63 ^{x,b}	9.75 ^{y,b}	4.86	0.21 ^{x,b}	0.15 ^y	0.01	10.78 ^{x,a}	34.63 ^{y,bc}	4.00
SEM	0.78	0.03		12.30	0.89		0.02	0.03		3.94	2.57	

¹ n=10 goats per breed; C: Colostrum, M: Milk, SEM: Standard Error of Means, ^{x,y}Lsmeans within a row (for each hormone) with different superscripts differ significantly (P<0.05), ^{a,b} Lsmeans within a column with different superscripts differ significantly (P<0.05). The values are expressed as Lsmeans (SEM).

Conclusion These data confirm that adiponectin, leptin, ghrelin and resistin are present in goat colostrum and milk. The function of these adipokines in colostrum will require further investigation as they may have important roles, such as energy intake and immune system development, in the neonatal kid goat.

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References

- Guzel, S., Yibar, A., Belenli, D., Cetin, I. and Tanriverdi, M. 2017. Turkey Journal of Veterinary Medicine Science 79, 602-607.
- Hussein, Y.S., Maha, A.E., Hannan, A.T. and Mogada, K.M. 2015. Egyptian Journal of Chemistry and Environmental Health 1, 588-612.