Bolus Features for the Electronic Identification of Goats

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INTRODUCTION

The use of tamperproof, permanent and individual identification tags, applied at early ages, is required for proper animal tracing. Unlike cattle and sheep, retention of currently available boluses in goats is unsuitable according to ICAR recommendations (ICAR, 2007).

This work was aimed at building up a regression model of bolus retention in goats according to bolus features.

MATERIAL & METHODS

Animals & Management: Goats from Murciano-Granadina (dairy, n = 1,536), Alpine (dairy, n = 394) and Blanca de Rasquera (meat, n = 552) breeds were used. Murciano-Granadina and Alpine goats were fed concentrate, alfalfa pellets and straw according to lactation stage. Blanca de Rasquera goats were managed under extensive conditions.

Electronic boluses: 19 types of cylindrical boluses were used (n = 2,482). Boluses consisted of commercial and prototype devices made of ceramic or plastic tubes filled with different materials. Physical features ranged:

Weight (W): 5.3 to 110.8 g.
Volume (V): 2.7 to 26.0 mL.
Specific gravity (SG): 1.0 to 5.5.

Each bolus contained an ISO HDX glass encapsulated passive transponder of 32 x 3.8 mm.

Data recording & analysis: Full-ISO handheld transceivers working at 134.2 kHz (Gesreader 2s, Rumitag, Spain) were used to perform static readings of boluses at 7 and 30 d post-administration and thereafter every second mo.

In the event of a bolus loss (not readable), a heavier bolus was applied. Retention rate (RR) was calculated from data obtained from 12 to 24 mo post-application, as follows:

RR (%) = 100 x (boluses read / animals monitored)

A non-linear regression model was adjusted to retention data by using the NLIN procedure of SAS v.9.1.

RESULTS & DISCUSSION

No application problems were observed for any bolus type. Results of bolus retention are shown in **Table 1**. Retention rate ranged from 0 to 100% depending on bolus physical features. The 4 boluses with greater SG (> 4.29) offered 100% retention.

Table 1. Physical features of ruminal boluses and their retention rate (RR, %) in goats.

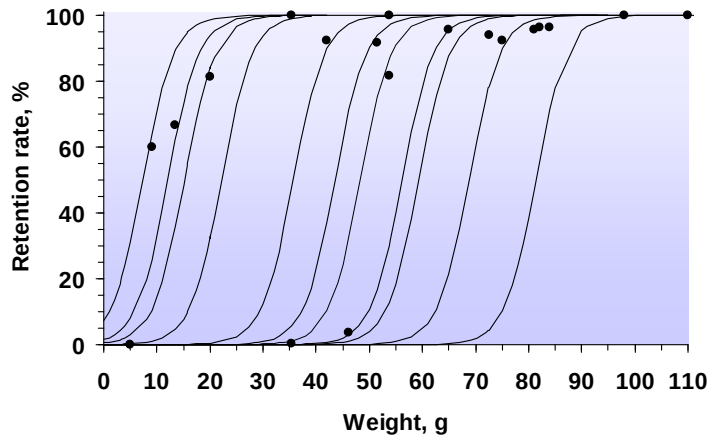
Type	W, g	V, mL	SG	Applied	Controlled		RR, %
					Read	Lost	
1	5.3	5.1	1.0	25	0	25	0
2	9.0	2.6	3.4	45	21	14	60.0
3	13.7	3.9	3.5	92	65	26	71.4
4	20.1	5.2	3.9	636	476	109	81.4
5	35.4	21.9	1.6	30	0	29	0
6	35.5	7.2	4.9	33	30	0	100
7[1]	42.1	11.6	3.6	42	36	3	92.3
8	46.2	22.2	2.1	28	1	26	3.7
9[2]	51.6	14.4	3.6	56	44	4	91.7
10	52.9	9.7	5.5	31	29	0	100
11[3]	53.8	15.4	3.5	24	21	1	95.5
12	64.9	18.1	3.6	50	43	2	95.6
13	72.5	18.9	3.9	258	225	14	94.1
14	75.0	22.3	3.4	504	424	35	92.3
15	80.7	19.9	4.1	150	131	6	95.6
16	82.1	22.6	3.6	393	364	14	96.3
17	84.0	22.5	3.7	30	27	1	96.4
18	97.9	23.4	4.2	30	29	0	100
19	110.8	26.0	4.3	25	24	0	100
	—	—	—	2,482	1,990	309	—

1 Innoceramics (Italy); 2 Allflex (France); 3 Rumitag (Spain)

Data allowed fitting a non-linear regression model (R^2 = 0.98; P < 0.01) of bolus retention according to their V (mL) and W (g) (**Figure 1**); SG was implicitly considered in the model. Moreover, an exponential relationship (r = -0.84; P < 0.01) was observed between SG and W for the predicted values of bolus retention; consequently, reduction in bolus dimensions requires remarkable increments of the SG.

Estimated W and SG to produce a standard bolus (22 mL) with RR > 99% are 95 g and 4.3, respectively. For medium size boluses (10 mL), estimated values were 50 g and 5 SG, respectively.

Figure 1. Retention rate (RR,%) of ruminal boluses according to their weight and volume (— mL) in goats.



IMPLICATIONS

A regression model properly explained the retention of boluses in goats according to bolus physical features; Suitable long-term retention of medium sized boluses has been managed by using highly dense manufacturing materials.