



N18.83

Determination of ruminated tablet number using soluble marker

*M. Richter^{†1}, J. Třináctý^{*1}, M. Rabišková², T. Sýkora². ¹Agrovýzkum Rapotín, Ltd., Dept. Pohořelice, Czech Republic, ²University of Veterinary and Pharmaceutical Sciences, Brno, Czech Republic*

[†]Corresponding autor: richter@vuvz.cz

This study was supported by MSM2678846201 and GACR 523/02/0164.

For experiments in area of dairy cows amino acid nutrition the ruminally protected tablets containing protein, free amino acids or mix of them has been developed. In consequence of their size (>5 mm) an unnegligible part of them can be regurgitated. The proportion of regurgitated particles and their passage rate through the GI tract are besides of their physical characters influenced by animal factor and dry matter intake (Třináctý et al., 1999a). For obtaining of more correct predictions of amino acid duodenal flows a simple and uninvase method for determination of actual proportion of regurgitated tablets was investigated. In cooperation with University of Veterinary and Pharmaceutical Sciences the inert tablets with requisite physical characters containing soluble undigestible marker were developed. The principle of their function consists in determination of from damaged tablets released marker in feaces. In experiment the proportion of regurgitated tablets determinated by the direct (counting) and undirect (using marker) method were compared.

MATERIAL AND METHODS

Animals, feed and procedures

Three lactating Holstein cows (1. – 3. lactation, 17. – 35. week of lactation) weighing on average 523 kg were fitted with ruminal and duodenal cannulas. Cows were fed individually twice daily *ad libitum* a mixed diet based on a corn silage (54.7%), alfalfa hay (15.0%) and a supplemental mixture (30.3%). The dry matter intake averaged 15,7 kg.

Inert tablets were made in The University of Veterinary and Pharmaceutical Sciences. Their core contained soya protein concentrate, tablet additives and soluble marker and were

coated by inert layer on a base of ethylcellulose developed in mentioned university. Because of high recovery (Brandyberry et al., 1991) ytterbium chloride was chosen as a soluble marker.

The experiment was performed in two 6 day periods. First day of each experimental period paper bolus containing 2000 tablets was placed into the rumen bottom of each dairy cow through the ruminal cannula. Feaces collected during 6 days from each cow were pooled at 12 hour intervals, weighed and after homogenisation representative sample for DM and Yb determination was taken. The rest of feaces was washed on 4 mm screen to recovery of present inert tablets and number of them was record.

Calculations and statistical analysis

The proportion of regurgitated inert tablets determined directly was calculated from cumulative values of tablets recovery (unrecovered tablets) and indirectly (using marker) from ytterbium recovery (Fig. 1). The following equation was used as a model for the comparison of results: $Y_{ij} = \mu + M_i + C_j + R_k + \varepsilon_{ijk}$, where: μ = total average, M_i = effect of the method ($i = 2$), C_j = effect of the dairy cow ($j = 3$), R_k = effect of the repeating ($k = 2$) and ε_{ij} = residual error.

RESULTS AND DISCUSSION

Changes of recovery in last intervals are negligible and 144th hour can represent final values (Fig. 1). In despite of high differences between animals only in the case of regurgitation determined using marker we found out significant difference (Tab. 1). A wide range of values between periods was the probable reason of it. Significant difference ($P < 0.05$) was given between the means of the proportion of regurgitated inert tablets determined directly and indirectly using marker (Tab. 1). Provided that ytterbium recovery represented amount truly ruminated inert tablets, a fate of 7 % (SEM = 2.02) unrecovered tablets remained thus unexplained. For longer time retaining of large particles in forestomach compartments was discussed in work of Třináctý et al. (1999b). Nevertheless, the proportion of regurgitated inert tablets determined indirectly using marker (9.6 %) was comparable with values for plastic particles with diameters of 6, 8 and 10 mm (5.3, 8.0 and 10.7 %, resp.).

CONCLUSIONS

The proportion of regurgitated functional tablets determined by the method of the inert tablets using soluble marker can be underestimated because of retaining of their part in forestomach compartments.

REFERENCES

- Brandyberry S. D., Cochran R. C., Vazant E. S. and Harmon D. L., 1991. Technical note: effectiveness of different methods of continuous marker administration for estimating fecal output. J. Anim. Sci. 69, 4611-4616
- Třináctý J., Šimek M., Zeman L., Harazim J. 1999a. Passage of large plastic particles through the digestive tract of lactating and dry cows. J. of Anim. and Feed Sci. 8, 263-272
- Třináctý J., Schmeiseroval L., Suchý P., 1999b. Passage and retaining of plastic particles in digestive tract of dry cows. Czech J. Anim. Sci. 44, 263-268

Figure 1. Excretion pattern of recovered tablets (tablets) and recovery of marker expressed as unrecovered ones (marker).

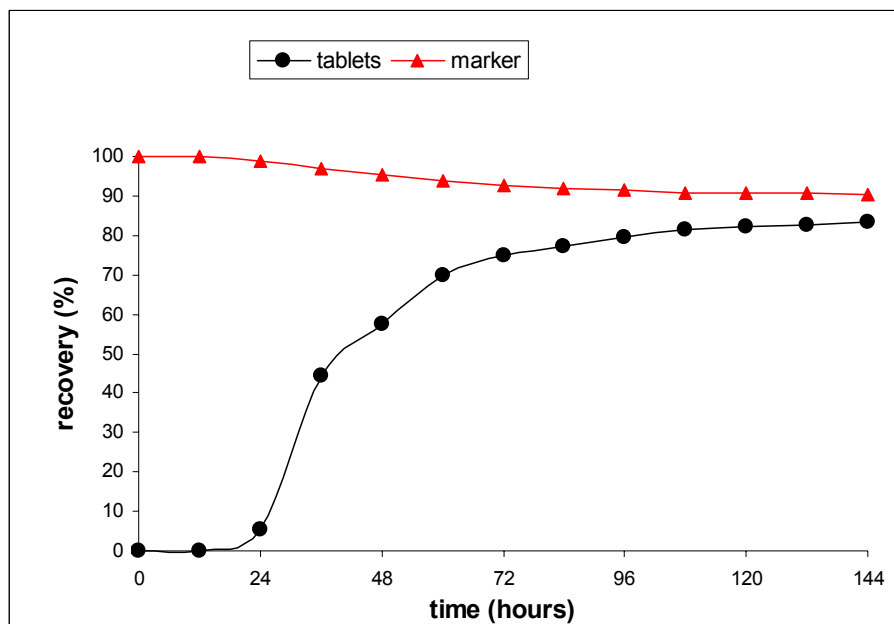


Table 1. Comparison of the regurgitated inert tablets proportion determined directly (Tablets) and using soluble marker (Marker) in dairy cows.

Method	Number of dairy cow			Mean	SEM
	1	2	3		
Tablets	18.3	10.2	21.6	16.7	2.6
Marker	13.8 ^a	6.4 ^b	8.7 ^{ab}	9.6	1.7
Difference	4.5	3.7	12.8	7.0*	2.0

^{ab} means in the same row with different superscripts differ significantly ($P < 0.05$)

* difference between means in the same column is different from zero ($P < 0.05$)