Values of pH Rumen Content Depending by Sampling Techniques Impact of Rumenocentesis on the Health of Dairy Cows, by Monitoring of Clinical Status

Veterinary Medicine

Keywords: SARA, ruminal pH, nasoesophagal probe, rumenocentesis, rumen contractions.

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Abstract

The aim of the study was to assess the difference on the value of pH rumen content depending on sampling techniques (with nasoesophagal-probe and rumenicentesis) and monitoring of clinical status for the health and welfare of cows for milk production affected by rumenocentesis. The difference in the average value of pH rumen content in all samples analyzed was 0.109 pH units increased when the rumen content was sampled with nasoesophagal-probe. The data obtained show that technique of rumenocentesis has impact on the health of animals. By tracking the overall clinical indicators, in two cows (2/10 or 20%) were observed increase in body temperature to 39.8 ° C values, increasing the density of up to 37 respiratory breathing per minute, increasing performance up to 92 heart beat per minute and hypotony condition, with reduction in the number of rumen contractions to 3 movement for 5 minutes.

Introduction

A number of pathological condition that underlying disorders in the fermentation processes in the ruminal environment require the evaluation of pH ruminal content, Ceroni V. et.al (2005). In well-managed farms where the animals used to eat meals with high energy levels and where the risk of the presence of subacute rumen acidosis (SARA) is more likely, is necessary clinical monitoring of pH rumen content, Oetzel GR (2003); Ceroni V.et.al (2011). In farms with over 100 head, control of pH rumen content in 12 randomly selected heads is sufficient to assess the functional status of fermentation processes and effectiveness of the ration for the whole farm, Nordlund K, (1994, 1995) , Oetzel GR (2003). Monitoring the pH of rumen content is often used for diagnosis of rumen acidosis, Dirksen, G. et al. (1987). Appropriate techniques to ensure getting of sample from content of rumen, accepted by many researchers is rumenocentesis, because it makes possible the recognition of the state at the time of inspection, JMD Enemark, et al. (2004, 2008). Rumenocentesis is proposed as a good diagnostic tool for the assessment of SARA in cows, Nordlund and Garrett (1994), Nordlund et al. (1995) Garrett (1996, 1999). Rumenocentesis for sampling the content of rumen is rated as "severe" technique and not always is easily accepted by farmers, Kleen, JL, et al. (2003), Krause, K.M. et al. (2006).

For indirect assessment of functional status of rumen in ruminants, it is in use and increase the number of clinical indicators related to overall control of food, nutrition assessment, controls and indicators (hematological and hematobiochemical) of blood, urine, faecal , etc., Ceroni V. et.al (2012). Practice shows that such controls remain in auxiliary roles and analyzing

the content of rumen fluid remains without doubt the most important evidence, Ceroni V. et.al (2011). In order to avoid manipulation by rumenocentesis, thought to study the technique of nasoesophagal-probe for sampling content from rumen. The study aims to identify the level of change in pH values of rumen content depending on the sampling techniques and also to assess the impact of rumenocentesis on the health of dairy cows.

Material and methods

Determining the difference in values of pH rumen content in cows was based on the application of two sampling techniques and rapid measurement of pH. Were selected rumenocentesis techniques and techniques through nasoesophagal probe. Technique through nasoesophagal probe have not found in the literature sources used, but thought it use to avoid as much as possible contact of rumen content with saliva. Even when using the nasoesophagale probe exist the risk of contamination with nasal secretions (serosal). This can be avoided by eliminating the first portions of the rumen content fluid. Removal of the front portions of the rumen content fluid when it deals with esophagal probe significantly reduces the influence of salivary in pH values, Dirksen and Smith (1987). To conduct the study were selected 10 cows, of different ages and with no clinical signs of disease. From each cow was sampled the content of rumen with rumenocentesis and nasoesophagal probe. At the moment the measurement of pH sample was carried out with portable pH meter and the corresponding values were compared. In a 6-day period after rumenocentesis manipulation, animals were monitored clinically, 2 times daily for clinical indicators of body temperature, density of pulse, breathing and rumen contractions. The results obtained were compared with the rate values, were statistically processed and were developed random graphs and equations of linear regression.

Results

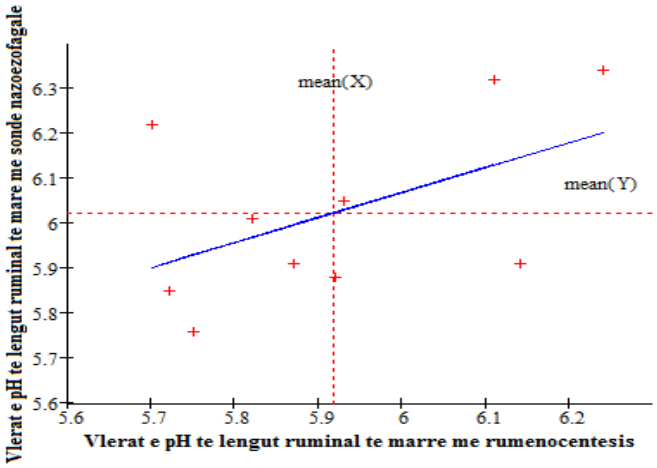
The data obtained for the value of pH rumen content by sampling technique are given in Table 1. As has been shown in all cases there were differences in the pH of rumen content dictated by the techniques of making. In most cases (8 of 10 or 80%) of pH values of rumen contents were higher when the content was sampled with nasoesophagal probe. In two cases (cow num. 4 and num. 6), pH values of rumen contents were reduced when rumen fluid was sampled with nasoesophagal probe. The average of difference value of rumen pH content in all samples analyzed was 0.109 pH units higher when rumen content was sampled with nasoesophagale probe.

Table 1. *Ruminal pH value, according the technique used for sampling and the difference between them.*

Cow Nr.	Ruminal pH value, according the technique used for sampling		
	Rumenocentesis	Nasoesophagal probe	Difference ±
1	5.8	5.9	+ 0.1
2	5.6	5.7	+ 0.1
3	5.9	6.1	+ 0.2

4	5.8	5.7	- 0.1
5	5.7	5.8	+ 0.1
6	5.9	5.8	- 0.1
7	5.8	6.1	+ 0.3
8	5.7	6.0	+ 0.3
9	5.9	6.1	+ 0.2
10	5.6	5.8	+ 0.2
Average	5.763	5.872	+ 0.109

Ruminal pH value, according the technique used for sampling seem to have links between them. The data obtained were processed statistically and attached between them appear in the graph no. 1, linear regression and a factorial regression equation.



$pH(_{rumenocentesis}) = 5.91 \pm 0.05$

$pH(_{nasoesophagal\text{-}probe}) = 6.02 \pm 0.06$

Difference = 0.109 ± 0.01

r = 0.512

Graph 1. *Relation of pH values from the rumen content, depending on the technique used for sampling.*

Standard error = 0.185

The authenticity of the change, tD = - 1.198

Standard deviation = 0.203

One factorial regression equation: $pH_{(probe)} = 2.732 + [0.556 \times pH_{(centesis)}]$ or

$$pH(centesis) = \frac{[pH(sonde) - 2.732]}{0.556}$$

From our data it seems that between pH values of rumen contents sampled with nasoesophagal probe or rumenocentesis, were small differences and between the indicators has correlative relation (r = 0.512) strong and positive character. The equation of dependence between two factors can serve to convert values of rumen pH content, when sampled with nasoesophagal probe. The survey data indicated rumenocentesis impact on the health of animals. By tracking the

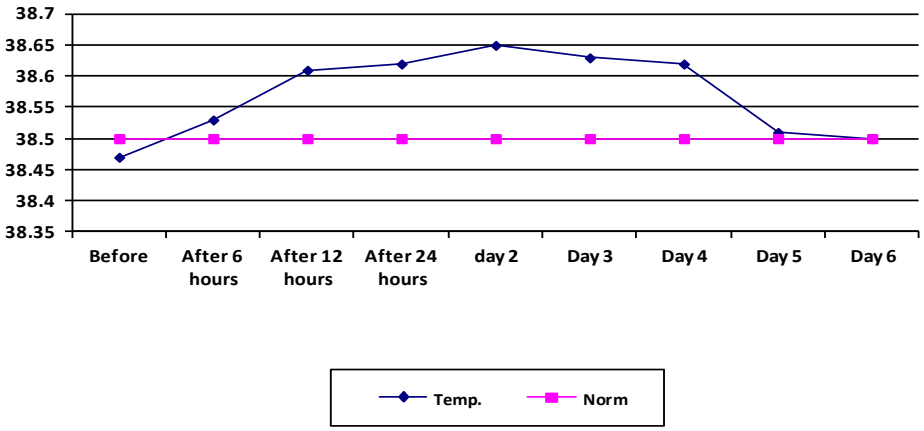
overall clinical indicators, in two cows (2/10 or 20%) were observed increase in body temperature to 39.8 ° C values, increasing the frequency of breathing to 37 respiratory acts in minute, the increase up to 92 of heart beat per minute and decrease of rumen contractions to 3 movements for 5 minutes. Table 2 shows data on the average clinic values of overall indicators registered in cows where was applied rumenocentesis technique for sampling fluid from the rumen content.

Table 2. *Mean values of general clinical indicators in cows in the study, according to the time of measurement.*

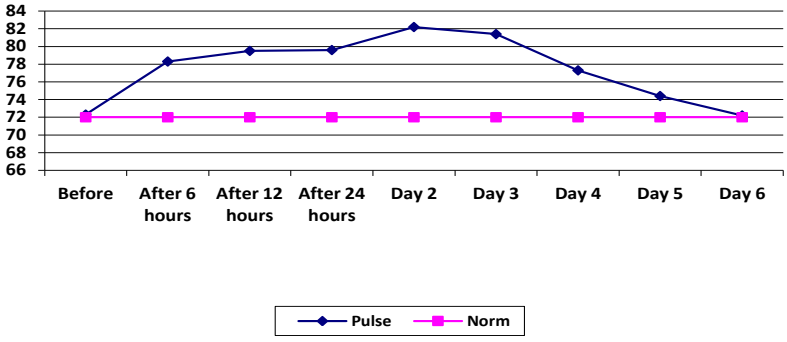
Time of measurement	**The average of indicators checked, depending on the time of measurement**							
	Body internal temperature		Pulse frequency		The frequency of respiratory acts		Rumen motility	
Before the intervention	38.47		72.3		26.4		8.2	
After 6 orë hours	38.53		78.3		32.3		6.4	
After 12 hours	38.61		79.5		34.4		5.5	
After 24 hours	38.62		79.6		32.2		5.6	
Control. 2 times a day	Morning	Evening	Morning	Evening	Morning	Evening	Morning	Evening
Day 2	38.65	38.64	78.3	82.2	34.2	36.1	5.8	5.8
Day 3	38.62	38.63	77.4	81.4	32.6	37.4	5.8	5.1
Day 4	38.60	38.62	76.2	77.3	30.4	32.3	6.2	6.3
Day 5	38.45	38.51	72.4	74.4	27.6	28.1	8.0	8.8
Day 6	38.43	38.50	74.1	74.2	26.3	27.3	8.1	8.4

For comparison were prepared graphs with average curves of general clinical indicators, comparing the rate with average values recorded in animals where rumenocentesis technique was applied. As appears from the graph 2, the average body temperature of the animals in the group treated with rumenocentesis increases starting 12 hours after application of surgical manipulation. On the second day and the third increased body temperature reaches maximum values and the 5th day of the animals presented with body temperature and rate levels.

Graph 2. *The average value of body temperature in cows treated with rumenocentesis technique.*

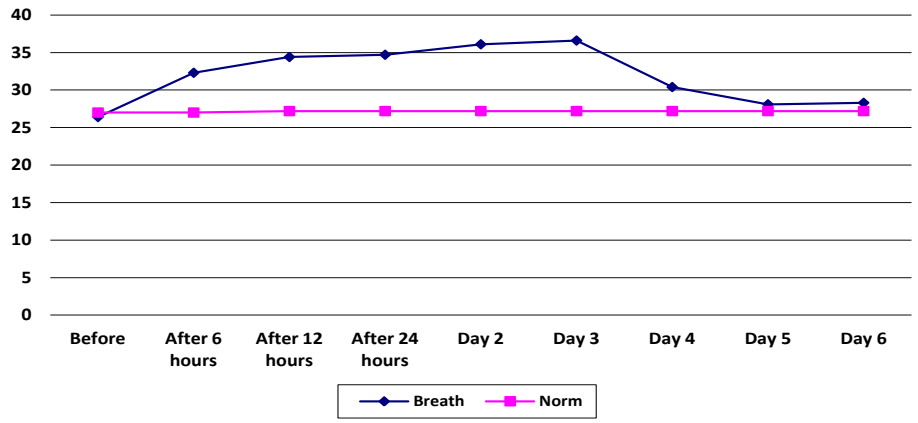


Around the same curve moves and the pulse density indicator. The maximum values of the pulse density was recorded on the second day and the third and fifth day after the marked decline in the rate of this indicator, chart 3.



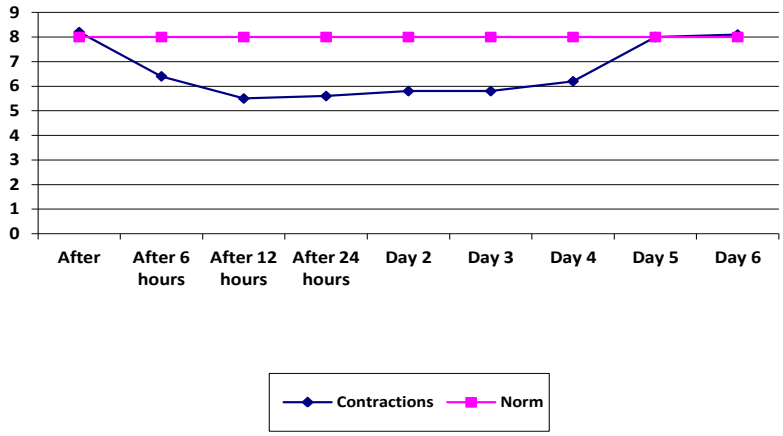
Graph 3. *The average value of the pulse density in treated cows with rumenocentesis technique.*

Graph 4 present the average values of respiratory density. Frequency of breathing (on average) increases on the second day and the third after rumenocentesis and reaches rate values around the fifth day.



Graph 4. *The average value of the density of breathing in cows treated with rumenocentesis technique.*

Rumen contractions in clinical evaluation resulted reduced. As has been shown in Graph 5, the decline in the number of rumen contractions starts to become apparent 6 hours after manipulation.



Graph 5. *The average value of rumen contractions in cows treated with rumenocentesis technique.*

Discussion

Such comparative studies of the values of pH rumen content depending on the techniques used are made by other authors. Comparisons of results for the values were different and not only related techniques, but also by means of their application. Most often it is done comparison of rumenocentesis technique, or ruminal fistula with esofagal probe technique. Researchers Dirksen and Smith (1987) in their work, report changes in pH values in ruminal fluid when the content of rumen fluid was obtained through esofagale probe, the samples had values of pH significantly higher, from 0:14 to 0:19 units, compared with samples taken by ruminal fistula. In the difference of results affects contamination of sample with saliva which dilates the sample, Dirksen and Smith (1987). Contamination with saliva is around 10-12%, Enemark et al. (2004). Given such results, Garret (1996) states that the sampling of fluid from the rumen content by esophagal probing for diagnostic purposes (especially in case of the presence of SARA condition) should not be taken into consideration. The data of our results to the difference of 0.109 pH units depending technique of nasoesophagal probing of rumen contents are close to the results obtained by researchers when using the technique of rumen fistula and lower than those obtained by various authors in the use of esophagale probes, Enemark et al. (2004) Garrett (1996). There we found the applied technique of making the content of rumen fluid with nasoesophagal probe.

Average difference of 0.109 pH units in the pH of the contents of rumen in our judgment is connected with the place or position in the rumen where the probe and the sample taken is not only acceptable, but worth recommending practical application the technical content of rumen sampling. Such a difference in the pH value of the content, we think that does not affect the classification and evaluation of animal according groups, as it is smaller than the range of the pH value to pass from animal affected by SARA conditionin to group of healthy animals. On the other hand using the found value of the difference of 0.109 pH units, as the conversion ratio, the results will be closer to reality. Relations of indicators and a factorial regression equation are facts in favor of the above judgment. Technique of nasoesophagal probe is easy to implement, requires no special training and readily accepted by animals.

Rumenocentesis technique assessed by general clinical indicators associated with consequences on the health and welfare of animals, especially when this technique is applied to the large number of heads. Health effects were observed in 20% of cases treated, but disorders of rumen activity were observed in all treated animals. For change of clinical indicators and peristaltic of rumen, our data are closer to those of other authors, Garry (2000).

Rumenocentesis techniques, regardless of the accuracy of sample values, can not be used in terms of production on farms. This technique can be used for purposes of scientific research and in small groups of animals. In the same opinion is and researcher Garry (2000), which states that when asked to handle large amounts of samples, this technique (rumenocentesis) should be avoided.

Conclusions

1. The difference of the average value of the pH rumen content, realized after sampling with nasoesophagal probe technique and rumenocentesis was 0.109 pH units, higher when rumen content sampled with nasoesophagale probe.

2. Between pH values of rumen content when sampling are made by nasoesophagal probe and rumenocentesis has strong correlative relation (r = 0512) and positive character.

3. Rumenocentesis technique affects the health of the animals. In animals treated with rumenocentesis were observed complications in approximately 20% of heads.

4. Based on the results, we believe that sampling the content of rumen in farms of dairy cows should be applied nasoesophagal probe technique. This technique is relatively easy to apply, does not require special training, does not affect the health and welfare of animals.

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