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Evaluation of rumenocentesis practicability as a routine diagnostic technique in veterinary practice

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ABSTRACT

To evaluate rumenocentesis as a diagnostic tool in routine veterinary practice and its effects on the health of sampled cows, a total of 196 ruminal fluid samples were drawn by rumenocentesis from 10 dairy herds. Puncture site alterations and clinical status of the sampled cows were evaluated 4 and 7 days following rumenocentesis, respectively. A small local reaction and abscess formation were observed in 24 (12.24%) and 1 (0.5%) of the sampled cows, respectively. No case of haematomas formation or general health impairment was observed.

Key words: rumenocentesis, dairy cattle, health

Introduction

Subacute ruminal acidosis (SARA) is the consequence of feeding high grain diets to dairy cows, which are adapted to digest predominantly forage diets (OETZEL, 2003). SARA is characterized by daily episodes of low ruminal pH between 5.5 and 5.0 (KRAUSE and OETZEL, 2006). This digestive disorder is difficult to diagnose in the field due to the variable and subtle clinical signs (KLEEN et al., 2003). The current definition of SARA is based on the pH of the rumen fluid. The recommended protocol for SARA diagnosis is the collection of ruminal fluid by rumenocentesis (GARRETT et al., 1999; NORDLUND et al., 1995). Although rumenocentesis is recommended by ENEMARK et al., (2002) as a better

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field test in comparison to oro-ruminal probe for measurement of rumen pH, the test is not yet being applied routinely because there is some doubt about its effects on the health and productivity of sampled cows. This study was designed to evaluate rumenocentesis as a diagnostic tool and its effects on the health of sampled cows.

Materials and methods

10 Holstein dairy herds in the Khorasan Razavi province, northeast Iran, were selected according to willingness to participate in the study. All herds were free stall housed, were greater than 250 in size, and fed total mixed rations.

Two groups of 12 cows were selected randomly from each herd. One group consisted of early lactation cows (3-20 days in milk) while the other consisted of mid lactation cows (60-150 days in milk).

Four to six hours following morning TMR feeding and after clinical examination, ruminal fluid collection was carried out by means of rumenocentesis. The puncture site was located 12 to 15 cm caudal to the costochondral junction of the last rib, on a horizontal line level with the top of the patella. Before rumenocentesis, the puncture site was shaved, disinfected (scrubbing with povidone-iodine and disinfection with 70% Ethanol) and locally anesthetized (with s.c. and i.m. injection of 2 mL of 2% lidocaine). The puncture was done using an 18 gauge, 120 mm long, stainless steel needle and 5-10 mL of ruminal fluid was aspirated with a 20 mL syringe. When a sufficient volume of ruminal fluid was obtained, a small volume of air was forced through the needle. Finally, the needle exit site was wiped with povidone-iodine. During rumenocentesis, the cow was restrained by tying the hocks together and the tail was elevated.

The clinical status and feed intake of the sampled animals were evaluated daily for 7 days after rumenocentesis. Palpation of the puncture site was carried out 3-5 (a median of 4) days after rumenocentesis and local cutaneous and sub cutaneous reactions were recorded.

Statistical analysis was performed using SPSS12 (Illinois, Chicago), and Chi-square tests were used for comparison of the ratio of cows with post puncture complications between primiparous and multiparous cows, and between fresh and mid lactation cows. Differences were considered significant at $P < 0.05$.

Results

It was possible to draw ruminal fluid from 196 of the 205 animals initially selected (75 early lactation and 121 mid lactation cows). In one dairy herd, due to different housing and feeding routines, two groups of 12 early lactation cows were sampled (primiparous and multiparous cows). Additionally, in four herds, no early lactation samples were obtained because there were not enough early lactation cows.

In two cows ruminal fluid sampling was not carried out due too heavy resistance and in four animals, after several tries, no ruminal fluid was obtained. Rectal examination of the latter cows revealed a small sized rumen. Visible blood contamination of the obtained samples caused the rumen puncture to be repeated in 10 cows.

No systemic disease due to rumenocentesis was recorded in the sampled cows (based on daily evaluation of cows for 7 days and disease recordings by farm practitioners for 6 months after sampling). Close examination of the puncture site revealed no local reaction in 172 (87.7%) out of the 196 sampled cows. Twelve cows (6.12%) showed a small cutaneous inflammation (less than 1 cm in size), which in 11 cows (5.61%) was 1-3 cm. One cow (0.5%) showed a cutaneous and sub cutaneous inflammation 5 cm in diameter, that changed to a superficial abscess and finally cured spontaneously. No case of haematomas formation at the site of the puncture was recorded.

Eighteen fresh cows and 6 mid lactation cows had cutaneous inflammation and the difference between these two groups was significant ($P < 0.001$). Sixty out of the 196 sampled cows were primiparous and 136 cows were multiparous. Thirteen primiparous and 11 multiparous cows showed post puncture complications and the difference between primiparous and multiparous cows was significant ($P < 0.05$).

Discussion

In the present study the effects of rumenocentesis on the health of dairy cows were assessed on a large scale. Our findings showed the practicability of rumenocentesis in herd diagnosis of SARA. Furthermore, quick diagnosis, low expense and rare complications support rumenocentesis as a suitable diagnostic technique. It yields reliable results, in comparison with an oro-ruminal probe, because the samples are drawn from the consistent region of the rumen. The absence of conditional variations in the obtained results, such as those seen with oro-ruminal probe sampling, allows for comparison of pH in individual cows and herds.

Although rumenocentesis complications and local pathologic lesions rates in our study were very low, in some previous studies haematomas and abscess formation at the puncture site and septic peritonitis were observed in different proportions of sampled cows (KLEEN et al., 2004). MORGANTE et al. (2007) and ENEMARK et al. (2004) performed rumenocentesis on 480 and 58 cows, respectively. None of the sampled cows in these studies had problems during and subsequent to the sampling. On the other hand, STRABEL et al. (2007) evaluated clinical and pathological consequences of rumenocentesis in 11 dairy cows. They reported: forced inspiration (3 cows), transient episodes of hyperthermia (2 cows), increased tension of the abdominal wall (8 cows), positive foreign body tests (3 cows), generalised septic peritonitis (one cow) and hematoma formation in the area of the puncture site (9 cows) as the consequences of rumemenocentesis. It seems that small

needle size, deep local anesthesia, local disinfection and a small volume of fluid collected were the underlying factors responsible for fewer post puncture complications in our study. According to our results, the occurrence of skin reaction to the rumenocentesis was different between fresh and mid lactation cows, and between primiparous and multiparous cows. Some factors, such as immune system condition (under stress or not) and the level of the cow's resistance during rumenocentesis (usually higher in primiparous cows) may affect the occurrence of rumenocentesis complications.

Although the use of this technique is straightforward, in small and medium sized dairy herds, selection of sufficient early lactation cows could be difficult. Furthermore, the recommended protocol for SARA diagnosis is collection of ruminal fluid by rumenocentesis from a sub-sample of 12 cows from a herd or diet group. If three or more cows in either group have rumen pH of 5.5 or less, the group is considered to be experiencing SARA (NORDLUND et al., 1995; GARRETT et al., 1999). This protocol applies to herds with either a high (>30%) or low (<15%) prevalence of low ruminal pH (ENEMARK, 2008). Time consuming, heavy resistance of some cows and blood contamination of samples are other probable problems in the use of rumenocentesis as a diagnostic procedure.

ACETO et al. (2000) reported that rumenocentesis causes a 16% decrease in the milk production of sampled cows. It seems that the stress levels at the time of rumen puncture and post puncture complications are the main determinant factors of the milk production decrement. At present, routine monitoring of rumen pH by rumenocentesis is the most efficient way to recognize SARA at an early enough stage to allow for corrective measures. Rumenocentesis is tolerated well by cows and the correct performance of this technique has few complications, so that prevention of economic losses due to SARA recompenses its complications and milk production decrement.

Conclusion

The present study confirmed rumenocentesis as a practicable diagnostic procedure for routine determination of ruminal pH and diagnosis of subacute ruminal acidosis in dairy cattle.

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SAŽETAK

Ukupno je 196 uzoraka buražne tekućine mliječnih krava iz deset stada bilo uzeto rumenocentezom radi njezine procjene kao dijagnostičke metode u svakidašnjem veterinarskom radu i njezinih učinaka na zdravlje pretraživanih krava. Promjene na mjestu punkcije bile su promatrane četiri dana, a kliničko stanje krava sedam dana nakon rumenocenteze. Slabe lokalne reakcije bile su primijećene u 24 (12,24%), a apsces u jedne (0,5%) krave. Nije primijećen nijedan slučaj hematoma ni slabljenja općega zdravstvenoga stanja.

Ključne riječi: rumenocenteza, mliječne krave, zdravlje
