Small Ruminant Research 108 (2012) 113–119

Contents lists available at SciVerse ScienceDirect

Small Ruminant Research

journal homepage: www.elsevier.com/locate/smallrumres

Prevention of Floppy Kid Syndrome: A long-term clinical field study conducted on a goat farm in South Tyrol/Italy

H. Gufler*

Veterinary Services Meran, Department of Hygiene and Public Health of South Tyrol, 39012 Meran, Italy

ARTICLE INFO

Article history:
Received 11 October 2011
Received in revised form 25 May 2012
Accepted 30 May 2012
Available online 1 July 2012

Keywords:
Floppy Kid Syndrome
Prevention
Separation
Bovine milk
D-Lactate
Survival analysis

ABSTRACT

Objective: To discover whether Floppy Kid Syndrome can be prevented by separating kids at birth from their dams and rearing them on bovine colostrum followed by cows' milk.
Design: Clinical field study during the period of 2000–2010.
Materials and methods: The study was conducted on a goat farm in South Tyrol, Italy. Kids were separated at birth from their dams and reared on bovine colostrum followed by cows' milk (group 1); kids were also reared traditionally leaving them to suckle with their respective dams (group 2). In both groups, clinical symptoms were recorded. In those exhibiting FKS, associated symptoms and recovery after treatment were documented. Cumulative probability of survival and determination of hazard rate were plotted using the Kaplan–Meier method.
Results: A total of 414 kids born on this farm over this period (2000–2010) were examined. None of the 146 kids of group 1 acquired FKS. In group 2, 16 from the 268 kids reared traditionally developed typical FKS. The symptoms of FKS, which were observed included altered general condition (apathy, somnolence, and lethargy), altered posture (knuckling over in the carpal joints, ataxia, and recumbency), salivation and abomasal distension. The difference between the groups was significant (χ^2 test, $p = 0.003$). Distribution of FKS in group 2 revealed that in January and February no cases of FKS occurred. In March, April, and May morbidity was at 2.6%, 69.2%, and 71.4%, respectively. Survival analysis in group 1 revealed a cumulative probability of survival of 1.00 and a hazard rate of 0.00 during the whole observation period (January to May). In group 2, a cumulative probability of survival of 1.00 for the first two days after birth, declining to 0.94 on the 11th day, was demonstrated. The difference in time between the groups was significant ($p = 0.003$) applying the Log Rank test. In group 2, for the period of March to May survival analysis revealed a cumulative probability of survival of 1.00 for the first day after birth, declining to 0.84 on the 11th day. This indicates a morbidity rate of 16% for this period. On the 4th and 5th day post partum the hazard rate was highest (HR = 0.04). After 11 days neither cumulative probability of survival nor hazard rate declined. The results of this study demonstrate an 100% probability that FKS will not affect kids after 11 days of age. A positive correlation was apparent between the recorded outdoor temperature and the incidence of Floppy Kid Syndrome.
Conclusions and clinical relevance: In this long-term study conducted on a goat farm in South Tyrol Floppy Kid Syndrome in goat kids can be prevented by separating neonate kids from

* Tel.: +39 3356149833; fax: +39 0473 442982.
E-mail address: helmuth.gufler@sbbz.it

0921-4488/$ – see front matter
http://dx.doi.org/10.1016/j.smallrumres.2012.05.015

the dams, and rearing the kids with bovine colostrum/milk. The important factor seems to be the separation of new born kids from adults, thus preventing exposure of kids via sucking/licking to the bacterial agent causing D-lactic acidosis, originating from the adult goats or their immediate environment. Greatest susceptibility for Floppy Kid Syndrome is in the period from March to May between the 3rd and 6th day post partum.

1. Introduction

Reports in literature about Floppy Kid Syndrome (FKS) in goat kids are sparse. The disease is characterized by weakness, somnolence, carpal flexion, ataxia, and recumbency (Bleul et al., 2006; Gufler and Pernthaner, 1999; Millemann, 2003; Riet-Correa et al., 2004; Rowe and East, 1996), salivation and abomasal distension in 3–14 days old kids (Gufler and Pernthaner, 1999). The characteristic reduced muscle tone in affected goat kids, gives the disease its name: in English publications "Floppy Kid Syndrome" (Riet-Correa et al., 2004; Rowe and East, 1996), and in German publications "Neonatales Lähmungssyndrom" (Gufler and Pernthaner, 1999). Tremblay et al. (1991) were the first to report metabolic acidosis without dehydration in goat kids in Canada, but did not find any correlation with FKS. Gufler and Pernthaner (1999) were the first authors to recognise that the symptoms of FKS are related to a metabolic acidosis. Bleul et al. (2006) were the first to describe D-lactate as being the organic acid responsible for metabolic acidosis in goat kids. The origin of D-lactate remains unclear to date. Causes of increase of D-lactate are include ingesting large amounts of rapidly fermenting glucides (Marcillaud et al., 1999), or an overproduction by certain strains of bacteria (Garvie, 1980).

In South Tyrol, Italy, where a long-standing tradition of goat husbandry exists, there are about 15.000 goats (Gufler et al., 2007). FKS has been well known here since the late eighties, and is the most important cause of early kid losses. The author's observations taken together with reports from local farmers indicate that the disease is uncommon in kids fed with bovine milk than in kids being nursed by their dams. To verify these findings in the period from 2000 to 2010, occurrence, signs and the course of Floppy Kid Syndrome in kids separated and reared on bovine colostrum/milk were documented, and compared with kids suckling with their respective dams.

The aim of this long-term field study was to investigate if FKS can be prevented by this method.

2. Materials and methods

2.1. Study area

A goat farm raising the native "Passeier Mountain Goat" was selected for this study, on which FKS had been present at a variable rate of incidence since 1986. For this reason the breeder was very familiar with the symptoms. A control programme for CAE infection had been started in 1999 on this farm (Gufler et al., 2005), therefore kids selected for later breeding were routinely separated after birth from their mothers and reared on bovine colostrum/milk. On this farm goats and cattle are kept in the same stable, separated by a wall. Hay is the staple diet for both species. Since the goats did not constitute a dairy herd, a high milk yield was undesirable. To ensure sufficient milk production for nursing dams, concentrates were fed in small quantities from 3 weeks before parturition to 8 weeks after. In contrast, the dairy cattle received a concentrate ration from 3 weeks prior to parturition, to drying of lactating cows. The main kidding season is February and March, while in January, April and May only few births occur. The farm is located at 1640 m above sea level. During January and February the climate in South Tyrol is usually dry and cold. During March and thereafter, the climate gets warmer. A weather station is situated in the immediate vicinity of the farm featured in this study. Archived data are publicly accessible on the internet under (http://www.provinz.bz.it/wetter/wetterstationen.asp?stat_stid=700#standort).

2.2. Animals

Kids selected for later breeding were separated from their dams at birth and brought into boxes in the cattle stable in order to comply with the CAEV control programme. Bovine colostrum was collected from the on-farm cows and administered to the kids three times daily. In the post-colostrum phase 3 times-daily feeding continued for 14 days, then subsequently reduced to twice daily. After initial individual bottle nursing, and once they had learned to suckle well, they were transferred to group nursing buckets, with a maximum of 10 nipples per bucket. Those kids not selected for breeding were allowed to remain for continuous nursing with their natural mothers until reaching slaughter weight at 6–8 weeks of age, traditionally just before Easter. Population density of the animals remained relatively constant due to the addition of herd progeny. No new dams were acquired, and animals up to the age of one year were used for breeding.

2.3. Clinical examination

In both groups, clinical symptoms were recorded. In those exhibiting FKS associated symptoms and recovery after treatment were documented.

2.4. Statistical analysis

Descriptive statistics are presented numerically as percentages of categorical variables. The variables in this study were defined: group 1: kids separated immediately after birth from the dams and raised with cows' milk; group 2: kids raised traditionally with their nursing dams; month: January, February, March, April, and May. As Floppy Kid Syndrome appears to increase at the end of kidding season, there was formed a cluster for January and February (JanFeb), and another one for March, April and May (MaApMay). Finally results were also analysed by year (2000–2010). The results (dependent variable) were compared by group, by month, by season, and by year using χ^2 test. A p value <0.05 was considered statistically significant.

Additionally, survival analysis was performed in this study. Survival analysis is the standard approach to evaluating prognosis following intervention (probability) in medical literature (Peto et al., 1976). Event time data (occurrence of Floppy Kid Syndrome) were recorded for each animal. Initial day was the day of birth. Observations on all surviving kids of the study were monitored at the end of May of each year for kids in group 1, and for kids in group 2 when they were slaughtered at Easter each year. Initial models included all variables, which were then removed from the models if they were demonstrated a $p > 0.05$. For all time-to-event analyses, Kaplan–Meier estimates were used and differences were compared by the Log Rank test. A p value <0.05 was considered statistically significant. The statistic analyses were carried out using the statistical program SPSS, version 16.0 (SPSS Inc. Chicago, IL).

3. Results

Descriptive statistics indicated that 414 Kids were born on the farm during this investigation spanning 2000–2010