



Contents lists available at ScienceDirect

The Veterinary Journal

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

Risk factors for stillbirth and dystocia in Japanese Black cattle

Mizuho Uematsu^a, Yosuke Sasaki^b, Go Kitahara^b, Hiroshi Sameshima^{a,c}, Takeshi Osawa^{a,b,*}^a Graduate School of Medicine and Veterinary Medicine, University of Miyazaki, Miyazaki 889-1692, Japan^b Department of Veterinary Sciences, Faculty of Agriculture, University of Miyazaki, Miyazaki 889-2192, Japan^c Department of Obstetrics and Gynecology, Faculty of Medicine, University of Miyazaki, Miyazaki 889-1692, Japan

ARTICLE INFO

Article history:

Accepted 10 July 2013

Keywords:

Cattle
Dystocia
Risk factors
Season
Stillbirth

ABSTRACT

Stillbirth and dystocia are major factors reducing the productivity of beef cattle. The objective of this study was to determine the effect of season, parity and gestation length on the rates of stillbirth and dystocia in Japanese Black cattle. Calving records were obtained from 905 farms in Miyazaki Prefecture, Japan. Data were collected from 41,116 calvings in 15,378 (14.42% primiparous).

There were 1013 stillbirths (2.46%) and 3514 dystocias (8.55%). The stillbirth rate in winter (December to February) (3.18%) was higher (odds ratio (OR) [95% confidence interval]: 1.008 [1.004–1.012]) than that in summer (June to August). Similarly, the dystocia rates in winter (OR: 1.011 [1.004–1.019]) and spring (March to May) (OR: 1.020 [1.013–1.027]) were significantly higher than in summer. For primiparous cows, the rates of stillbirth (OR: 1.010 [1.004–1.015]) and dystocia (OR: 1.053 [1.042–1.064]) were higher than in cows with fifth parity (reference parity). Stillbirth rates were higher in cows at ≥ 301 days of pregnancy (OR: 1.049 [1.035–1.062]) and those at ≤ 270 days of pregnancy (OR: 2.072 [2.044–2.101]) than those at between 281 and 290 days of pregnancy. Likewise, dystocia rates were higher in cows at ≥ 301 days of pregnancy (OR: 1.033 [1.008–1.059]) and those at ≤ 270 days of pregnancy (OR: 1.124 [1.095–1.154]) than those at between 281 and 290 days of pregnancy. Winter, primiparity, and long and short gestation lengths were risk factors for stillbirth and dystocia in this cohort of Japanese Black cattle.

© 2013 Elsevier Ltd. All rights reserved.

Introduction

Stillbirth and dystocia have a significant impact on the productivity of beef industry. As well as calf losses, they are also associated with decreased reproductive performance (Laster et al., 1973). The Japanese Black is the most common breed of beef cattle in Japan. These cattle are reared in an intensive system where the animals are housed throughout their life and fed with high-quality fodder (rice, Italian and oat straw) and concentrate. The production costs associated with this system are high and, in Japan, the value of a Japanese Black calf (and thus the cost of a stillbirth) is about four times that of a Holstein–Friesian calf.

However there are only limited data on the causes of stillbirth and dystocia in Japanese Black cattle. Ogata et al. (1999) reported that the stillbirth rate in Japanese Black cattle was 2.4%, and that stillbirth cases without a diagnosed cause were characterized by a shorter gestation length and a lower than normal birth weight. The objective of the present study was to identify the risk factors for stillbirth and dystocia in Japanese Black cattle by retrospectively analysing calving records.

Materials and methods

Study area

The study was undertaken using data from farms in the suburban areas of the city of Miyazaki, including the surrounding towns (Kunitomi and Aya). Of the 1101 farms in the area, calving data were available for 905 farms. Temperature data were collected at a measurement point at 131°24'E longitude and 31°56'N latitude at an altitude of 9 m (Japan Meteorological Agency). All of the 905 farms surveyed were located within a 20 km radius from the temperature measurement point. Their average altitude above sea level was 46.9 ± 50.6 m (mean ± SD).

Animals

Records from 41,116 calvings in 15,378 animals between April 2006 and March 2010 were used for the analysis. The mean number of adult cows per farm was 18 (range 1–454). All the animals were permanently housed in uninsulated open cubicle houses and there was no difference in air temperature between inside and outside. Rice, Italian or oat straw was fed individually to cows twice daily. All of the animals were bred using artificial insemination (AI).

Data collection

All of the dams had a 10-digit unique identification number (National Livestock Breeding Center). Dam number, birth date of dam, date of AI and calving, parity, gestation length, presence or absence of stillbirth or dystocia and causes of dystocia were obtained from the database managed by the Miyazaki Prefecture Livestock Association.

* Corresponding author at: Graduate School of Medicine and Veterinary Medicine, University of Miyazaki, Miyazaki 889-1692, Japan. Tel.: +81 985 58 7787.

E-mail address: osawa@cc.miyazaki-u.ac.jp (T. Osawa).

Definitions

Stillbirth was defined as a dead fetus found at a calving >240 days after AI (Ogata et al., 1995). Dystocia was defined as a calving that required veterinary assistance. All diagnoses were made by one of 30 veterinarians as it was required that any parturition-related problems encountered by farm staff had to have veterinary involvement.

Dystocia was classified either as having maternal factors such as uterine inertia and narrow birth canal, or fetal factors such as excessive birth weight, and abnormal position. Excessive birth weight was defined as >29 kg in female and >30 kg in male calves (Ogata et al., 1999; Ibi et al., 2008).

The period of calving was divided according to season, namely, winter (December to February), spring (March to May), summer (June to August) and autumn (September to November). Gestation length was divided into five groups: (1) ≤270 days; (2) 271–280 days; (3) 281–290 days; (4) 291–300 days; and (5) ≥301 days.

Statistical analysis

All statistical analyses were conducted with SAS software (SAS Institute). A mixed-effects logistic regression model using the GLIMMIX procedure with contrasts was applied to investigate the association of season, parity and gestation length with stillbirth and dystocia rate. The model used was:

$$\text{Logit}(p_{ijklmn}) = \alpha + \text{PY}_i + \text{SSN}_j + \text{GL}_k + F_l + Y_m + F_l \times Y_m,$$

where p_{ijklmn} was the probability of a stillbirth occurrence (stillbirth rate) or probability of dystocia (dystocia rate); α was the intercept; PY_i was the fixed effect of the i th parity group ($i = 1-10$); SSN_j was the fixed effect of the j th season group ($j = 1-4$); GL_k was the fixed effect of the k th gestation length group ($k = 1-5$); F_l was the random effect of the l th farm ($l = 1-905$); Y_m was the random effect of the m th calving year ($m = 1-5$); $F_l \times Y_m$ was the random interaction effect between the l th farm and the m th year.

Two-way random interaction was used to account for part of the correlations of data within groups in the model. Odds ratios (ORs) and 95% confidence intervals (95% CI) were estimated for each risk factor.

Results

Mean lowest temperatures in spring, summer, autumn and winter were 11.3 °C, 22.8 °C, 16.0 °C and 4.5 °C, respectively, and mean highest temperatures in spring, summer, autumn and winter were 20.7 °C, 29.8 °C, 24.5 °C and 14.4 °C, respectively.

The average age, parity and gestation length of the 41,116 calvings are summarized in Table 1. Stillbirth was diagnosed in 1013 (2.46%) of the 41,116 calving. Stillbirth rates were lowest in summer and highest in winter, changing cyclically throughout the 4 years (Fig. 1). Stillbirth rate in winter was higher than in summer (OR [95% CI]: 1.008 [1.004–1.012]) as was the spring stillbirth rate (1.004 [1.001–1.008]; Table 2). The stillbirth rate at first calving was higher than at fifth calving (1.010 [1.004–1.015]; Table 3). Compared to cows that calved between 281 and 290 days of pregnancy, stillbirth rates were higher in cows which had been pregnant for ≥301 days (1.049 [1.035–1.062]), for ≤270 days (2.072

[2.044–2.101]) and for at cows which had been pregnant for between 271 and 280 days (1.084 [1.076–1.092]) (Table 4).

Out of the 41,116 calvings, 3514 involved dystocia (8.55 ± 27.96%). There was no instance of fetotomy, but a total of 82 Caesarean sections were performed. The overall mean dystocia rate on the 905 farms was 12.43 ± 15.12%. The dystocia rate was associated with season, parity and gestation length. Dystocia rates in winter (1.011 [1.004–1.019]) and spring (1.020 [1.013–1.027]) were higher than in summer (Table 2), and dystocia was more common in primiparous cows than in fifth parity cows (1.053 [1.042–1.064]; Table 3). Dams calving after 291–300 days had the lowest dystocia rate of all the gestation length groups (Table 4).

Of the 3514 cases of dystocia, 254 (7.2%) involved a stillbirth. Among the different causes of dystocia, excessive fetal birth weight was the most frequently encountered finding (39.7%). However, the major reasons for fetal death during dystocia were congenital anomalies, twins and abnormal position and/or posture (Table 5).

The rate of dystocia caused by excessive birth weight was significantly associated with season, parity and gestation length (Tables 2–4). The dystocia rate caused by excessive birth weight in spring was higher than that in summer (1.005 [1.001–1.010]; Table 2). Dams calving at 301 days or later had a higher dystocia rate due to excessive birth weight than dams calving at ≤300 days ($P < 0.05$; Table 4).

The rate of dystocia caused by abnormal position and/or posture was associated with season and gestation length, but not with parity (Tables 3 and 4). Dams calving at a gestation length of 291–300 days had the lowest rate of dystocia caused by abnormal position and/or posture (Table 4). In addition, rates of dystocia caused by abnormal position and/or posture in winter and spring were higher than those in summer and autumn (Table 2).

Discussion

In this dataset, the stillbirth rate of Japanese Black cattle was 2.46%, consistent with a previous report (Ogata et al., 1995). The incidence of stillbirth has significantly increased during the past 10–20 years in Holstein cows in the United States and Sweden (Meyer et al., 2001; Berglund et al., 2003). The relatively low stillbirth rates in the Japanese Black breed might arise from the intensive calving management of these housed beef cattle.

The stillbirth rate in winter was higher than those in summer and autumn. The winter of 2007 had the highest temperature and lowest stillbirth rate (2.41 ± 0.56%) of the 4 years of the investigation period. Deutscher et al. (1999) reported that as average winter temperatures decreased, subsequent calf birth weights increased and calving difficulty increased. Azzam et al. (1993) reported that calves born to 2-year-old cows were more susceptible to severe weather conditions than those born to older cows, and that the negative effect on survival increased with decreasing temperature. Further studies will be required to determine whether, in Japanese Black cattle, there is an association of calf birth weight and stillbirth/dystocia rates with temperature.

Primiparous cows had higher rates of both dystocia and stillbirth than did multiparous cows. Mee (2008) reported that the principal types of dystocia differ between primiparous and multiparous cows, with fetal–pelvic disproportion predominating in the former and fetal malposition in the latter. In order of importance, the two major determinants of fetal–pelvic disproportion are calf birth weight and maternal pelvic size. Japanese Black cows reach their full body size at 36 months of age (Wada and Nishida, 1987). In the present survey, the mean age of cows at their first calving was 713 days, so they were not yet fully mature. Heifers with an immature pelvis that are pregnant with a large fetus are at the greatest risk of dystocia.

Table 1
Descriptive statistics of 41,116 calvings in 15,378 animals that were kept in 905 farms^a located in Miyazaki.

	Number of animals	Mean ± SD
Stillbirth rate (%)	41,116	2.46 ± 15.50
Dystocia rate (%)	41,116	8.55 ± 27.96
Dystocia by excessive birth weight (%)	41,116	3.40 ± 18.11
Dystocia by abnormal position and/or posture (%)	41,116	2.13 ± 14.43
Parity	41,116	4.87 ± 2.95
Age at calving (days)	41,116	2283.37 ± 1206.05
Age of first conception in heifers (days)	5855	425.41 ± 63.95
Age of first calving in heifers (days)	5855	713.00 ± 64.13
Gestation period (days)	41,116	289.73 ± 5.92

^a The mean number of adult cows per farm was 17.96 ± 29.05 animals (range 1–454).

Download English Version:

<https://daneshyari.com/en/article/5798505>

Download Persian Version:

<https://daneshyari.com/article/5798505>

[Daneshyari.com](https://daneshyari.com)