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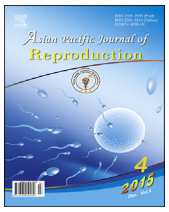

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Incidence of uterine torsion during veterinary-assisted dystocia and singleton live births after vaginal delivery in Holstein-Friesian cows at pasture

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ABSTRACT

Objective: To determine the incidence of uterine torsion and their association with live births after vaginal delivery at pasture.
Methods: A total of 119 veterinary-assisted dystocia, occurred in Holstein-Friesian cows, were accessed between September 2012 and February 2013 from Azores islands (Portugal). The general health status of dam, cause of dystocia, obstetric treatment choice, number and viability of fetus were evaluated.
Results: The uterine torsion represented 24.4% (29/119) of total assisted dystocia. The general health status was normal or slowly affected, at delivery time, for 96.6% (28/29) of the cows with uterine torsion. Vaginal delivery after rolling cows, cesarean section or euthanasia were performed in 72.4% (21/29), 24.1% (7/29) and 3.5% (1/29) of dams with uterine torsion, respectively. Singletons were observed in 96.6% (28/29) and 86.7% (78/90) of cows with uterine torsion and remaining dystocia, respectively. After vaginal delivery, the occurrence of singleton live births was more probable to occur in cows with uterine torsion (17/21) than the remaining cows (37/70) of control group (odds ratio = 3.79; 95% interval of confidence from 1.16 to 12.41; $P < 0.05$).
Conclusions: A high frequency of uterine torsion was observed in Holstein-Friesian cows with normal or slowly affected general health status at delivery time at pasture. The singleton live births prevailed and, in general, their occurrence by vaginal delivery after uterus reposition were most likely to occur in cows with uterine torsion than dams presenting other dystocia.

1. Introduction

Dystocia in cows, with special emphasis for Holstein-Friesian genotype, is an important adverse condition that can reach 10% of total calvings in herds and have significant economic impact in dairy industry [1]. Although genetic traits can influence the incidence of dystocia [2], a decrease of their incidence appears to occur in free management systems, such as pasture [3]. However, the incidence variation of dystocia observed between housing and pasture systems can be the reflex of several factors related with cows (genotype, nutrition, body condition score and exercise) and factors related with the herd size and the calving management [1].

Feto-pelvic disproportion, fetal oversize or malposition, and maternal conditions related with incomplete cervical (and vulvar) dilatation and uterine inertia are considered the most significant direct cause of dystocia [4]. However, although low relative proportions (3%–10%) of uterine torsions was related in the past [5,6], recent studies suggests an improvement of uterine torsion incidence, more than 20%, regarding the dystocia assistance by field veterinarians [7,8], independently of the management systems and particularly in summer season [9]. However, more determinations of uterine torsion incidence, regarding the different seasons and herd management systems are necessary from different worldwide regions.

Other than risk factors, the clinical management of uterine torsion also have a significant impact in animal health and economics losses or expanses for farmers. Frazer *et al.* [5]

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reported that the cesarean section was performed in 62% (n = 95) of cows with uterine torsion and a vaginal delivery, after uterus relocation, was made only in 38% of the dams. The incomplete cervical dilatation after successful uterine torsion correction was an important constraint observed in their study. However, in the study performed by Aubry *et al.* [7], only 11% (n = 6) of the cows with uterine torsion was subjected to cesarean section and the incidence of birth canal lacerations following vaginal delivery was similar to cows presenting other dystocia. In fact, at our knowledge and experience, the vaginal delivery until 3 h after rolling the cow [9] seems to be the greater choice in the majority of the uterine torsion cases without apparent adverse effects for the dam and calf. Consequently, both animal welfare and herd economics expanses can be minimized by the decreasing of caesarian section number.

The main aims of the present study were (1) to determine the incidence of uterine torsion of Holstein-Friesian cows exclusively at pasture, regarding veterinary-assisted dystocia, and (2) to evaluate singleton live births occurrence after vaginal delivery.

2. Materials and methods

2.1. Animals and dystocia classification

The present study was conducted at Agricultural Association of San Miguel (http://www.aasm-cua.com.pt/) from pastures of S. Miguel Island – Azores between September 15 2012 and February 15 2013. A total of 119 Holstein-Friesian cows at pregnancy term (≥260 days) and presenting dystocia were evaluated. All heifers had older than 24 months at calving time. The study was prospective and all dystocia assisted by experimented veterinarians working in the agricultural association.

The definitive diagnosis was performed by veterinarian and maternal or fetal dystocia classified according the described by Noakes *et al.* [10] as uterine inertia (primary or secondary), failure of abdominal expulsive forces, incomplete cervical dilatation, uterine torsion, feto-pelvic disproportion and/or fetal oversize, fetal maldisposition (posterior presentation, lateral or transversal position and malposture), fetal death, developmental defect or other presumed minor prevalent causes.

In cows presenting uterine torsion, the presence of feto-pelvic disproportion and/or fetal oversize and incomplete cervical dilatation, if existing, were also registered.

All cows with uterine torsion were subjected to uterus correction by rolling method without or with a plank ('Schäfers' method), as well described by Lions *et al.* [9], before fetal extraction. The remaining cows, presenting dystocia (other than uterine torsion), were considered as the control group.

For all dystocia, the fetal extraction was performed and classified as (1) vaginal delivery (without fetotomy), (2) caesarian section of the entire calf or (3) fetotomy followed by vaginal removal of the body parts. Euthanized dams were also registered and considered as case resolution.

2.2. Data from clinical records

After dystocia diagnosis and/or treatment of the parturient, each veterinarian also registered and classified several variables, such as parity (1st, 2nd, 3rd or ≥ 4th), general health status, pregnancy type (single *vs.* twin) and viability of each fetus (stillbirth *vs.* live birth until veterinarian departure).

The general health status was categorized in three classes, as normal, slowly affected or severely affected parturient, according the clinical global evaluation and using progressive degrees of depression, weakness, respiratory and heart or pulse rates, rectal temperature and standing *vs.* recumbent position indicators of the parturient during the obstetric examination.

2.3. Statistical analysis

Descriptive statistical analysis was used in order to determine uterine torsion incidence and several proportions of studied traits according cows with uterine torsion or dystocia causes of the control group. Univariate logistic regression models were tested in order to determine the effect of the two groups (independent variable) on the several parameters (dependent variables). Odds ratios and their 95% confidence were also calculated. Differences between groups were significant level for Likelihood ratio tests at a P-value 0.05 level. The JMP® 7 [11] software statistical package was used.

3. Results

Regarding all dystocia, the incidence of uterine torsion was 24.4% (29/119). The incidence of each dystocia included in the control group was reported in Table 1.

The uterine torsion was corrected after rolling cow in 92.9% (26/28) of the treated cases. In this group, vaginal delivery, cesarean section or euthanasia was performed in 72.4% (21/29), 24.1% (7/29) and 3.5% (1/29) of the cows, respectively. No fetotomy was performed in cows with uterine torsion, contrarily to the control group (five fetotomies).

Several studied parameters according the percentages observed in each group were reported in Table 2.

Feto-pelvic disproportion was lesser probable to occurs in cows with uterine torsion than in dams of control group (odds ratio = 0.12; 95% confidence interval from 0.02 to 0.92; $P < 0.05$).

The incidence of singleton live births after vaginal delivery was 81.0% (17/21) in cows with uterine torsion and 52.9% (37/70) in remaining dams (control group) and were significantly affected ($P < 0.05$) by group variable (odds ratio = 3.79; 95% IC from 1.16 to 12.41).

Table 1
Causes of dystocia in the control group (n = 90) and their incidence according the 119 veterinary-assisted cows (n,%).

Cause of dystocia	Incidence
Fetal malposture	23 (19.3)
Fetal posterior presentation	16 (13.4)
Incomplete cervical dilatation (ICD)	14 (11.8)
Feto-pelvic disproportion	12 (10.1)
Fetal death	6 (5.0)
Secondary uterine inertia	5 (4.2)
Failure of abdominal expulsive forces	4 (3.4)
Primary uterine inertia	4 (3.4)
Fetal monsters	3 (2.5)
Fetal lateral position	2 (1.7)
Fetal transversal presentation	1 (0.8)