

INCIDENCE OF REPEAT BREEDING SYNDROME IN HOLSTEIN FRIESIAN CATTLE

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Abstract

Repeat breeding syndrome could be described as a cow's failure to conceive after three or more than three inseminations in the absence of any clinically relevant abnormality.

In order to determine the incidence of repeat breeding, a retrospective study which included data from 682 Holstein Friesian cows within two dairy herds across Belgium were collected during two consecutive years. Thus, the repeat breeding overall incidence in dairy cattle was 18.1% (124 cows). The highest incidence of repeat breeding syndrome was recorded during spring season (5.6%, n=38) the lowest incidence being during winter season (2.9%, n=20). Regarding postpartum disorders, our study revealed that in cows with endometritis, metritis, milk fever and retained fetal membranes, the incidence of repeat breeding was higher than in cows that became pregnant within first three artificial inseminations (were considered to have normal fertility). According to parity number, the highest incidence of repeat breeding syndrome was recorded during 1st (3.9% n = 27) and 5th (4.1%, n = 28) parities, the lowest incidence being recorded during 6th (1.9%, n = 13) and 7th (0.29%, n = 2). Also, in cows with repeat breeding, the reproductive indices were negatively modified, triggering thus a poor reproductive performance. In conclusion, our results show that repeat breeding syndrome involves a various number of factors, such as postpartum disorders as well as extrinsic factors.

Key words: repeat breeding syndrome, cattle, incidence, postpartum

INTRODUCTION

Repeat breeding syndrome is one of the major infertility problems in dairy cows worldwide, the incidence of this condition ranging from 3 to 10% [1]. The potential causes of repeat breeding syndrome mainly include: subclinical endometritis, nutritional deficiency, specially trace minerals and vitamin A, age of the dam, improper heat detection and endocrine dysfunction [1].

A repeat breeder cow is any cow that have failed to conceive after three or more services, showing normal estrous cycles, at least one calved before and no clinical pathologies [7].

Fertilization failure and early embryonic death are the major causes of repeat breeding

syndrome which are influenced by uterine infection, genetics, ovulatory failure, error in estrus detection, improper timing of service [7].

According to Verma et al. (2018), incidence of repeat breeding syndrome was far higher in crossbred cows (17.57%) as compared to buffaloes (12.74%) and indian indigenous cows (8.64%) and may be attributed to frequent occurrence of dystocia in crossbred cows followed by retained fetal membranes and metritis/ pyometra/ endometritis complex which leads to high incidence of repeat breeding syndrome.

At this moment, repeat breeding syndrome is a substantial problem for cattle breeders both because of the lack of information of farmers regarding this syndrome, as well as because of a poor reproductive management at the herd level.

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Thus, the present study aims to establish the incidence of repeat breeding syndrome in Holstein Friesian cows and to highlight the presumptive risk factors which might be responsible for this condition.

MATERIAL AND METHODS

This retrospective study was carried out on 682 Holstein Friesian cows from two farms across Belgium, during two consecutive years (2016 – 2017). The data from the target population taken under study were collected from the farmer's official registers and comprised information regarding: cow identification, breed, birth, calving numbers, abortions, breedings and diagnosed disorders.

The exclusion criteria for cows from the target population were conducted under the following conditions:

- if they have been diagnosed during our study with certain reproductive disorders (uterine diseases, persistent corpus luteum, cystic ovarian disease);
- if they did not fit into the category of cows with three or more services.

The factors considered for the analysis within our study were: parity, season and certain postpartum reproductive disorders, as risk factors for repeat breeding syndrome.

RESULTS AND DISCUSSION

The analysis of recorded data within our study indicates that the overall incidence of repeat breeding syndrome was 18.1% (n = 124 cows).

According to parity number, the highest incidence of repeat breeding syndrome in cattle was recorded during 1st (3.9% n = 27) and 5th (4.1%, n = 28) parities, the lowest incidence being recorded in 6th (1.9%, n = 13) and 7th (0.29%, n = 2) parities (fig. 1). Both in 1st and 5th parities, the highest incidence of repeat breeding syndrome was recorded during spring season (fig. 1).

Our results regarding the high incidence of this syndrome during spring season, can be attributed to photoperiod length and to temperature variations which are linked to the season and could influence the endocrine regulation of the estrous cycle in cows. Other factors such as body condition at calving,

feeding level and calving insemination interval are also season-related, and can be modified through management practices [9].

Similar results regarding the high incidence of repeat breeding syndrome in 1st parity were obtained by Yusuf et al. (2012), who observed that lower parity, abnormal resumption of postpartum ovarian cycles, and shorter days in milk at first artificial insemination were the risk factors for repeat breeding syndrome and in contrast to those obtained by Bonneville-Hébert et al. (2011), who claims that cows in second, third, and fourth parities had significantly higher odds of being a repeat breeder.

According to season, the highest incidence of repeat breeding syndrome in dairy cattle, was recorded during spring (5.6%, n = 38) and summer (5.3%, n = 36) seasons, the lowest incidence being recorded during winter season (2.9%, n = 20) (fig. 2), our results being similar to Khan et al. (2016) and Verma et al. (2018).

According to Martin-Perez et al. (2011), ovarian follicular growth and development of the dominant follicle can be altered during the summer months and heat stress exerts a depressant effect on the endocrine mechanisms (reduced intensity of estrus, decreased preovulatory LH peak, etc.) and/or the embryo, reducing thus the fertility.

Furthermore, heat stress shortens the duration and intensity of estrous expression leading to silent ovulation [4].

A possible explanation for the low incidence of this syndrome during autumn (4.4%, n = 30) (fig. 2) season found in our study, is that animals during this time of the year are in a state of thermal comfort, our results on lower incidence during the autumn season being consistent with those obtained by Verma et al. (2018).

Similarly to our study, Rodrigues et al. (2007) stated that cows have lower conception rates during the summer than winter, and hypothesized thus that the lower fertility of repeat breeding Holstein cows is associated with a decrease in oocyte competence due to summer heat stress.

A number of postpartum reproductive disorders as risk factors for repeat breeding syndrome were considered (retained fetal

membranes, milk fever, metritis, endometritis). Thus, the overall incidence of various reproductive disorders in cows with this syndrome was 29% (n = 198) (fig. 3).

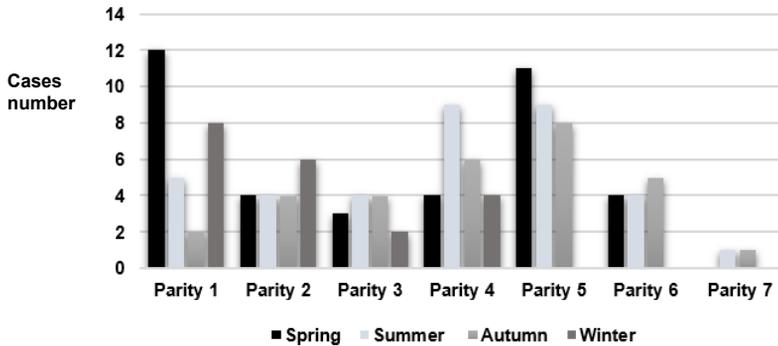


Fig. 1 Distribution of Repeat Breeding Syndrome cases according to parity number in Holstein Friesian cows (2016 - 2017)

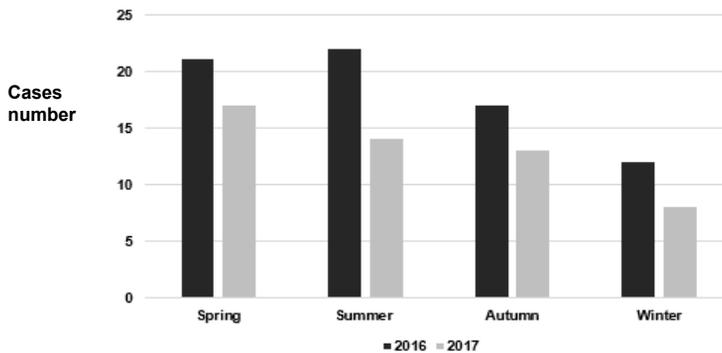


Fig. 2 Distribution of Repeat Breeding Syndrome cases according to season in Holstein Friesian cows (2016 - 2017)

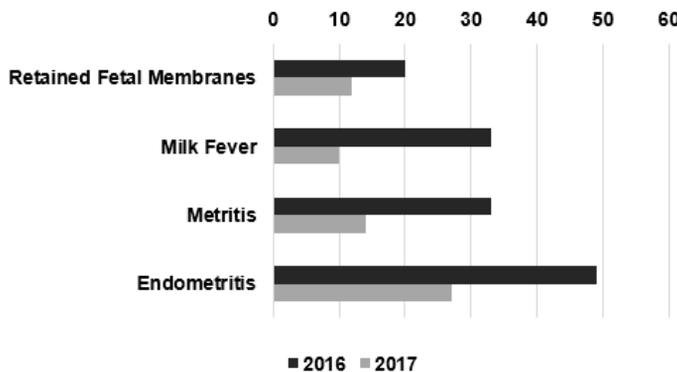


Fig. 3 Distribution of reproductive disorders in Repeat Breeding Holstein Friesian cows (2016 - 2017)

During the two years of study, 25.8% (n = 32) of cows classified as repeated breeding, have been diagnosed besides other reproductive disorders, with retained fetal membranes (fig. 3), which were favoring factors that significantly lowered fertility, increased the number of days open and also the number of services per conception.

According to Laven et al. (1996), retained fetal membranes in cattle increases the risk of developing metritis its results being in agreement with our study (42.1% of cows with retained fetal membranes subsequently developed metritis), and LeBlanc (2008), who claims that 25% to 50% of retained fetal membranes were associated with metritis.

Regarding milk fever in repeat breeding syndrome group of animals, our study revealed that for the two years of surveillance the incidence was 34.6% (n = 43), of all 124 cows diagnosed with this syndrome (fig. 3).

Besides uterine disorders and ovarian pathologies, metabolic pathologies such as milk fever and ketosis, can also affect normal fertility in cows, being able through various mechanisms, to reduce the number of estrous cycles prior to recommended insemination period.

Thus, according to Butler (2000) and Vanholder et al. (2008), all these processes have a negative impact on reproductive indices such as the interval between calving and first insemination, the chance of conception during first breeding, the interval between calving and successful insemination, and the number services.

The findings of the present study showed that in case of metritis the incidence was 37.9% (n = 47) of all cows from repeat breeding syndrome category (fig. 3), this pathology being directly connected with the subsequent appearance of endometritis (61.8% of cows with metritis developing in the future endometritis).

Among the 124 cows diagnosed with repeat breeding syndrome, 61.2% (n = 76) have been diagnosed with endometritis, our results being supported by Singh et al. (2000), who claims that endometritis, mainly of bacterial origin constitutes a major cause of repeat breeding syndrome, especially in cross-bred cows in developing countries

probably due to the expanding use of artificial insemination combined with unhygienic conditions.

Taking into consideration that according to Bonneville-Hébert et al. (2011), retained fetal membranes increases the risk of developing metritis and has a high incidence in repeat breeding syndrome category cows, metritis can be thus considered more problematic than other uterine pathologies. Thereby, we can affirm that our results are consistent with those obtained by Bonneville-Hébert et al. (2011), which states that dystocia, retained fetal membranes, complex metritis, and endometritis are clearly related to a decreased fertility in cows.

Moreover, according to Opsomer et al. (2000) and Williams et al. (2007), dystocia, retained fetal membranes, metritis, and endometritis result from mechanical and/or functional damage to the uterus and significantly decrease fertility. Some of these conditions are even recognized as being associated with ovarian dysfunction.

Based on Bonneville-Hébert (2011) findings, there is a high baseline risk of cows becoming repeat breeders if they are not exposed to peripartum reproductive disorders: 20.4% of cows (76.715/376.307) with no peripartum reproductive disorders became repeat breeding as opposed to 26.4% of cows (11.108/42.076) with peripartum reproductive disorders.

CONCLUSIONS

In conclusion, repeat breeding syndrome can be considered a multifactorial problem which involves both environmental and management related factors like reproductive disorders which decreases fertility in cattle and increases the risk of culling in cows, because of the high number of artificial inseminations.

In order to increase the reproductive performance of cows in the future, is recommended to adopt nutritional, environmental and management strategies, to prevent heat stress during warm season and to reduce the incidence of postpartum disorders by treating them effectively.

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