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Survey on the performance of reproduction of some imported dairy cattle farms in the region of Mostaganem.

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ABSTRACT

Efficient reproduction of dairy cattle is the result of optimal calving intervals which, in turn, result in optimal milk and calf production per unit time. In addition, animals with reproductive failure are culled, limiting the choice of available animals capable of reproduction, and therefore limiting the genetic progress of traits of interest to breeders. Thus, the increase in the level of milk production will be at the expense of the fertility of dairy cows. In this regard, in our study, it was important to know what are the factors contributing to this decrease in fertility and how this level of production can affect the fertility of these cows. It is in this context that our study was carried out and the objectives assigned to the present work were to study the influence of the parameters of the beginning of lactation on the reproductive performance of dairy cows. Through the results obtained we noted the following points. The reproductive performances recorded show a poor management of the production of dairy cows. Several factors could explain these results, starting from the late setting of the dairy cows to the drying up, the bad detection and/or synchronization of the heats leading to a considerable loss of time for the reprogramming of the females to the reproduction.

1.Introduction

The dairy sector is of strategic importance because of its impact on food security and its place in the socio-economy. Following the increase of the milk needs of the Algerian population, Algeria had recourse to the importation of cows with high genetic potential. These cows, whose selection in their countries of origin was oriented towards milk production, have experienced, in recent years, a deterioration of reproductive performance. This finding of declining fertility is a data encountered in many studies conducted in Algeria (Ghozlane *et al.,* 2010, Bouzebda *et al.,* 2006), Tunisia (Ben Salem *et al.,* 2007), France (Kiers *et al.,* 2006) and England (Pryce *et al.,* 2004). However, the success of reproduction is essential and crucial for the economic profitability of the farm; it is a prerequisite for any production (Meskini *et al.,* 2021). Indeed, an efficient dairy production system must maximize individual cow productivity per unit of feed and per unit of time (Soltner, 2001;Walsh *et al.,* 2011). Efficient reproduction results in optimal calving intervals, which in turn results in optimal milk and calf production per unit time. In addition, animals with reproductive failure are culled, thus limiting the choice of available animals capable of reproduction, and consequently the genetic progress of traits of interest to breeders. Thus, the increase in the level of milk production has been at the expense of the fertility of dairy cows. In this regard, it is important to know what are the factors contributing to this decrease in fertility and how this level of production can affect the fertility of these cows? The objective of this work is to evaluate the reproductive performance and milk production performance of some dairy farms, and to study the influence of some factors of the beginning of lactation on the reproductive performance of the cows followed such as the maximum production (peak milk production), the cumulative milk production during the first 100 days, the protein

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rate of the two first controls (TP), the butter rate (TB) and the TB/TP.

2.Material and Methods

2-1. Choice of farms

We solicited practicing veterinarians to propose some of their clients, after which some farms were chosen for the following reasons:

- The availability and accessibility of information on the conduct of reproduction, feeding and milk production of cows;
- The size of the herd;
- The collaboration of the farmer

2-2. Origin and collection of data

Our study focuses on the analysis of data related to the parameters of reproduction and lactation of dairy cows (96 cows) recorded during the period of high lactation from January to June 2020.

The information used in this study was obtained after interviews with farm personnel (farm owner and veterinarian) and personal observations. Visits were made to each of these farms to collect data on milk production and reproduction

2-3. Reproduction data

We collected the following data: the cow's identification number, the lactation rank and the breed of the cow, the dates of the calvings and the dates of the inseminations allow us to calculate the reproduction parameters classically described in the literature, namely: Reproductive performance based on fertility parameters.

2-4. Data on milk production

We collected the daily milk production quantities of each cow. Thus, for each cow, two milk samples were taken during a period of 15 to 30 days for the first control and during 45 to 60 days for the second control. These samples are directly transported to the laboratory (in a cooler and kept at 4°C) to perform their physicochemical analysis.

2-5. Statistical processing

The final database was constituted by gathering all the available data in an Excel file. After having collected and sorted all the available data, we constituted a final database containing all the parameters necessary for the statistical treatment. The data were analyzed with the software "SPSS" Version 20 and Microsoft Office Excel 2007. Descriptive statistics (means, standard deviations and proportions) were calculated for each parameter.

3. Results and discussion

3-1. Descriptive analysis of the cows followed

3-1-1. Distribution of cows by parity: Our study focused on the analysis of data from 35 primiparous cows and 61 multiparous cows (Figure 1).

3-1-2. Distribution of cows by calving season To simplify the analysis, 4 seasons have been distinguished:

- Winter: December, January and February,
- Spring: March, April and May,
- Summer: June, July and August,
- Autumn: September, October and November

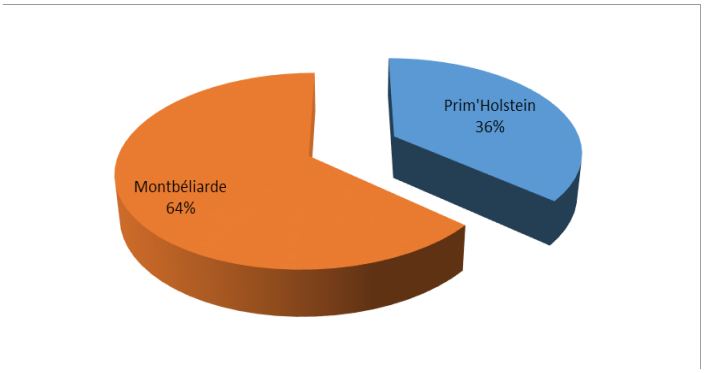

Fig. 1. Distribution of dairy cows monitored according to parity .

The distribution of the cows monitored according to the calving season is shown in figure 2

- 27% in winter ;
- 43% in spring ;
- 13% for summer ;

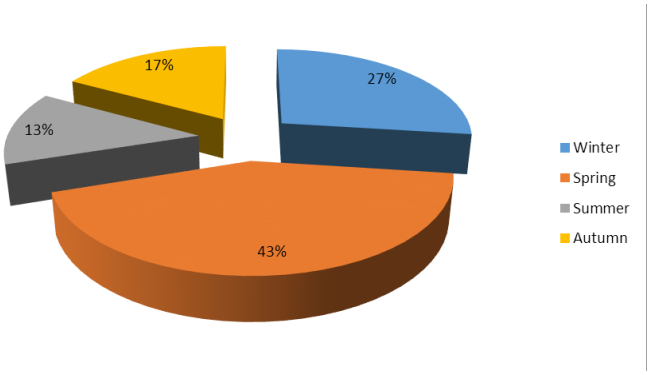

Fig. 2. Distribution of lactations studied according to the calving season of dairy cows .

- 17% for autumn.

3-1-3 Distribution of cows according to their level of milk production at peak The average milk production at peak (mean ± standard deviation) is 22.07 ±2.52 kg of milk. The median value is 22 kg. The peak milk yields were coded as qualitative variables and divided into three classes

- A class of cows with low peak milk production (PM < 18kg)
- A class of cows with medium peak milk production (18 ≤ PM ≤ 21kg)
- A class of cows with high peak milk production (PM > 21kg)

Figure 3 shows the distribution of the studied lactations according to the milk production at peak lactation. 33, 55% of the cows have low peak milk production (PM < 18kg), 38.56% of the cows have medium peak milk production (18 ≤ PM ≤ 21kg) and 27.88% of the cows have high peak milk production.

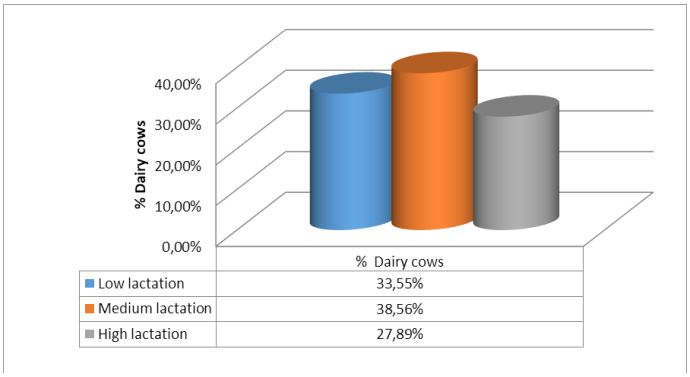

Fig. 3. Distribution of dairy cows according to their level of milk production at peak .

3-1-4 Distribution of cows according to their cumulative milk production level during the first 100 days: Milk production during the first 100 days (mean ± standard deviation) was 1680.73 ±151.72 kg of milk. The median value is 1568 kg. The cumulative milk production during the first 100 days was coded in qualitative variables and divided into three classes:

- A class of cows whose cumulative milk production during the first 90 days is a low period (PL100 days < 1500kg)(
- A class of cows whose cumulative milk production during the first 90 days is a medium period (between 1500 < PL100days < 1700kg)
- A class of cows whose cumulative milk production during the first 90 days is a high period (PL100days > 1700kg)

Figure 4 shows the distribution of the lactations studied according to the milk production during the first 100 days. 41.39% of the cows have an average cumulative milk production during the first 100 days.

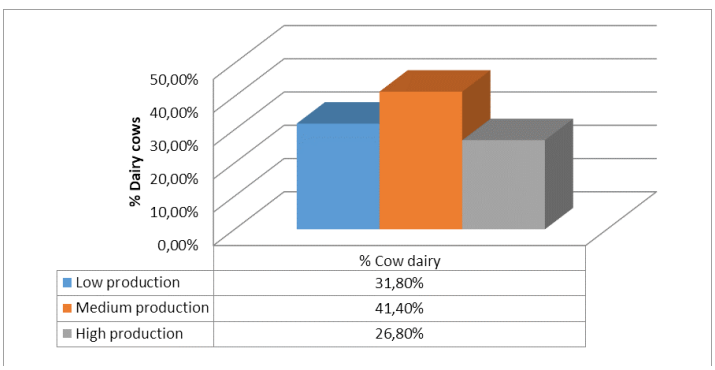

Fig. 4. Distribution of dairy cows according to their level of cumulative milk production during the first 100 days .

3-1-5 Analysis of the reproductive performance of the monitored dairy cows

3-1-5-1 Fertility parameters

Calving interval - 1st insemination

In the light of the results obtained, the time to reproduction is on average 132.4 ± 54.4 days. These results are far from the usual objectives for efficient reproductive management and optimal productivity. The calving-first insemination interval recorded in our study is lower than the results obtained by other authors in other regions of Algeria, Kaouche-Adjlane *et al.* (2016) (166 ± 59 days), Zineddine *et al.*, (2010) (159 ± 89 days). On the other hand, it is higher than that obtained in France (81.8 days) (Kiers *et al.*, 2006) and in Canada (87 days) (Bouchard and Du Trembley, 2003).

Calving interval - fertilizing insemination

The results show an average IV-IAF of 159.1 ± 49.5 days. This obtained time exceeds the target reported by Disenhaus et al. (2010). It is better compared to that found by Kaouche-Adjlane *et al.* (2016) (188 ± 47 days), Zineddine *et al.* (2010) (193 ± 108 days).

3-1-5-2 Fertility parameters

Success rate at first insemination (TRIA1)

We have 48.1% of cows fertilized in first insemination, while the objective of the literature is 60%. This result is also lower than the rates reported by Kaouche-Adjlane *et al.* (2016) or (70 ± 11%), Zineddine et al. (2010) or 67.4%.

Percentage of cows with 3IA and more

Infertility of dairy cows begins when we have more than 15% of cows that need more than 3 inseminations to be fertilized. In our case, 16.88% of cows are infertile after 3IA, which is bad compared to the standards, as well as compared to the results of Zineddine *et al.* (2010). However, this rate is close to that found by Bensalem *et al.* (2007) in Tunisia insemination.

The number of insemination for fertile insemination (AI/IAF)

The number of insemination to have a fertile cow is 1.85. This index is higher than the target specified by Disenhaus *et al.* (2010) but better than that of Bensalem et al. (2007) in Tunisia. On the other hand, compared to other studies done in Algeria by Zineddine *et al.* (2010), our result is considered very poor.

3-1-6 Relationship between early lactation parameters and reproductive performance of dairy cows

3-1-6-1 Cumulative milk production during the first 100 days and reproductive performance of dairy cows

With respect to fertility parameters, the increase in cumulative milk production during the first 100 days decreases significantly with increasing milk production. Indeed, cows with a high cumulative milk production during the first 100 days have a significantly lower success rate at first insemination (52%) compared to the other groups (Figure 5).

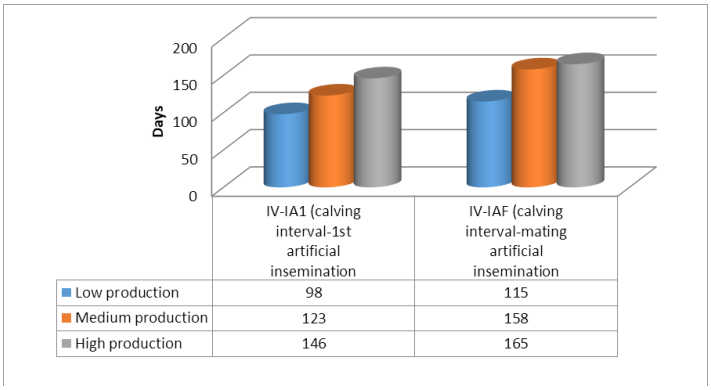

Fig. 5. Cumulative milk production during the first 100 days and interval between calving and mating insemination .

4. Conclusion

At the end of this study and in the light of the results obtained we can highlight the following points. The reproductive performances recorded show a poor management of the production of dairy cows. The extension of the interval between calving and fertilizing insemination is largely due to the extension of the delay of the cows after calving, thus leading to a prolongation of the calving-calving interval which exceeds the economic objective of one year. These results indicate poor fertility of the cows monitored. Several factors could explain these results, starting with the poor detection and/or synchronization of heats resulting in a considerable loss of time for reprogramming the females to a new artificial insemination AI.

The technicality of the inseminators is also questioned,in particular, the failure to respect the time of insemination in relation to the time of appearance of true heat, and the place of deposit of the semen, the setting to the reproduction of certain females during the period of uterine involution, or with a bad body condition after calving and the food conduct could be also incriminated in particular the quality of the used forages. In order to face these problems, we recommend the improvement of the feeding management by a rigorous rationing during the first weeks of lactation, in order to avoid an excessive mobilization of the body reserves, it is a period during which the reproductive function is particularly sensitive to the nutritional imbalances and the metabolic disorders.

Rationing adapted to the physiological stage of the cows, by structuring the dairy herd in three groups at the beginning of lactation, in the middle of lactation and in dry period, by adapting the distribution of concentrated feed to the level of production, adapting the distribution of concentrate taking into account the digestive and metabolic processes of the ruminants in order to decrease the prevalence of metabolic diseases. To this end, concentrates should be incorporated into cow rations to cope with low forage availability and nutrient deficiencies: nitrogen and/or energy.

The dynamic evaluation of the individual nutritional and energy status through milk monitoring, i.e. the measurement of the protein and butter content of the milk and their TB/TP ratio at the beginning of lactation, are tools of the future, inexpensive and easy to implement, which the farmers will have to learn to master in order to anticipate the occurrence of imbalances. The improvement of reproduction management by a good heat detection which is an important factor of the success of artificial insemination and the control of the moment of insemination.

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