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Researches regarding the Reproduction Outline and Indices in a Beef Herd in the South of Romania

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Abstract

Worldwide, having as aim the more and more cost effective animal rearing, specialized breeds are used by practising and experimenting modern methods of animal breeding and reproduction. Planning the adequate reproduction activity to each farm purpose in view leads to some high technological indices.

The aim of the present paper is the one of assessing the best methods of reproduction planning activity in a beef herd. There were analyzed the reproduction indices in a Charolais livestock, allotted to three categories of females: primiparous 36 females, 29 secundiparous females and 15 multiparous, a total of eighty-two reproduction stock. The study was conducted during three years and the reproduction indices were the following: length of pregnancy, service-period, calving interval, fertility rate, and sex ratio of the offspring. The animals come from import, from a total livestock nucleus of 21 heifers and a bull, the farm livestock increasing gradually to 96 heads. The females were used maximum five calving, and then culled. The age of females' introduction to reproduction is 22-24 months, the first calving being achieved at 2,5 years, maximum 3 years. There were used the grouped calving system and individual calving system along the year.

Following the three years study, even the reproduction indices did not differ significantly, by the grouped calving system obtained in early spring with the aid of synchronized heats, the early calves used better the grazing season offering increasing amounts of meat with less costs.

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Keywords: length of pregnancy, service-period, calving interval, fertility rate, sex ratio.

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1. Introduction

Nowadays, the worldwide consumption of animal products led to strong changes in the production structure. Thus, animal husbandry has become a main branch in all the countries with intensive agriculture. Having as aim a cost-effective exploitation of animals, there were created new breeds of animals, there were practiced various methods of animal breeding, there were experienced and implemented the most modern technologies, all of them in order to obtain as higher as possible livestock products. (Tapaloaga, 2014).

From the data provided by the F.A.O. and various international economic organizations, great significance shall be granted, in the context of animal husbandry, to cattle species as important source of meat and milk. It is well known that for decades, scientists all over the world have been investigating beef cattle efficiency. As the knowledge of beef cattle energy expenditures and nutritional needs expands, a more complete understanding of the efficiency of the beef production system is nowadays understood.

While there are several ways to evaluate the efficiency of cows, most are based on weaning a calf with minimum inputs, most importantly feed. Two areas stand out to measuring efficiency in beef cattle: the reproductive efficiency, more exactly the cows' ability to become pregnant and produce a calf every year and feed efficiency, the conversion of feed into energy used for maintenance, weight gain, milk production, and to support reproduction. To achieve these, a large number of researches were done for finding the best ways to obtain high reproductive indices.

In parallel with this concern, factors that influence the process of reproduction in domestic animals have been studied. These factors have more importance in the new conditions of exploitation of animals. In particular, we analyze the way the reproduction indices evolved: the length of pregnancy, service-period, calving-interval, fertility rate, and the ratio of sexes.

2. Materials and methods

For beef ranches or farms, the simple direct calculation of percentage of all mature heifers and cows that wean calves in any particular year provides a comprehensive picture of reproductive performance.

For the trials, we have chosen a number of 36 cows at their first pregnancy, 29 cows at the second pregnancy and 17 cows at the third pregnancy. The research has been carried out for during 2013-2015. All cows benefit for identical conditions of maintaining and feeding during the entire studied period. In order to achieve the proposed goals, we monitored the reproduction activity in the farm and we analyzed the data necessary to calculate the following reproduction indices: the length of pregnancy, service-period, calving-interval, fertility rate, and the ratio of sexes.

These indicators were looked separately for each age group, setting the main statistic parameters in the group.

3. Results and discussion

The pregnancy is a complex physiologic process between two partners – mother and foetus - and it lasts from fecundation to parturition (Tapaloaga, 2011). During all the pregnancy period, the maternal organism is more used, being the one which assure all the conditions for the development of the foetus (protection, nutrition, respiration, elimination of the metabolic products). When some disorders of the maternal and foetal functions appear, the pregnancy is interrupted and the abortion comes. It is known that the lifetime productivity of a cow is influenced by age at puberty (Fig. 3), age at first calving and calving interval. First calving marks the beginning of a cow's productive life. Age at first calving is closely related to generation interval and, therefore, influences response to selection.

The first measure of reproductive efficiency analyzed in the paper was the length of the pregnancy. The recorded data are shown in table 1 and figure 1 and it could be noticed that the lower mean value of this parameter was recorded in heifers' category, 284.36 days and the highest, in the cows at the second gestation, 286.12 days. The mean value for the whole studied herd was 285.75 days.

Table 1. Length of pregnancy (days)

Category n= 80	Average
Primiparous n=36	284.36 ± 4.8
Secundiparous n=29	286.12 ± 5.4
Multiparous n=15	285.75 ± 4.4
Herd	285.12 ± 5.1

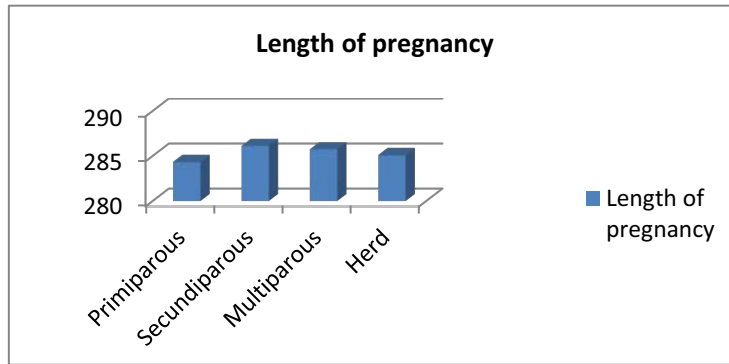


Fig. 1. Length of pregnancy

This value is considered a very good value for the standard of Charolais breed. The values monitored in the studied herd were achieved due to a well feeding and maintaining of the animals.

Calving-interval (CI) is a reproductive index that could be calculated only in cows which calved two or more times and it is expressed in absolute numbers. It could be calculated for each female, for the interval between two successive parturitions, or a mean value for a female for all parturition or for its entire reproductive life. At farm level a mean value for the whole livestock. Calving interval can be divided into three periods: gestation, postpartum anoestrus (from calving to first oestrus) and the service period (first postpartum oestrus to conception). The length of the postpartum anoestrus and service periods are sometimes called the "days open" period and it is the part of the calving interval that can be shortened by improved herd management. The "days open" period should not exceed 80-85 days if a calving interval of 12 months is to be achieved (Peters, 1984). This requires re-establishment of ovarian activity soon after calving and high conception rates. The duration of this period is influenced by nutrition (Wiltbank et al, 1962), season, milk yield, parity (Buck et al., 1975), suckling and uterine involution. In cattle, the optimum value of CI is 365 days, 80 days SP and 285 days GL (length of gestation)

Service-period (SP) study emphasizes a series of data related to the females' maintenance in late pregnancy and of course in the puerperal period. It is a very sensitive index, which has to keep the attention of specialists in the cattle farms. Related to species, it has variable values, in cows; the optimum value is 80 days (Tapaloaga, 2010).

In the present study, the value of service-period for the females after their first gestation is 93.75 days, it records lower values in the other two categories, the mean value for the entire herd being 87.61 days. The data are presented synthetically in table and figure 2.

Table 2. Length of service-period

Category n= 80	Average
Primiparous n=36	93.75 ±13.55
Secundiparous n=29	78.93 ± 15.08
Multiparous n=15	83.17 ± 20.84
Herd	87.61 ± 16.49

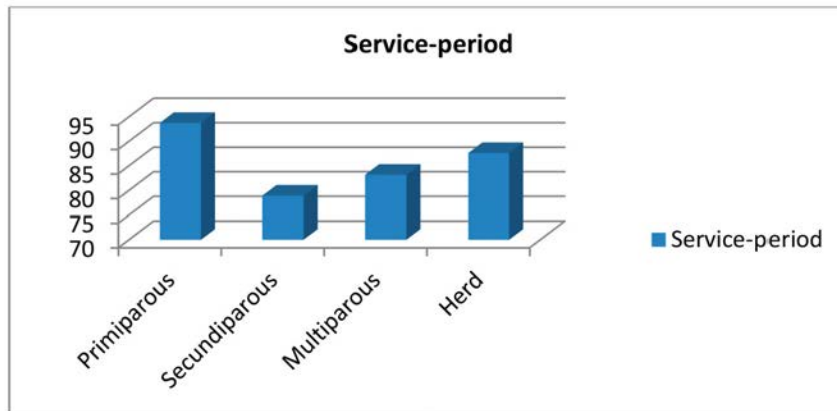


Fig. 2. Length of service-period

In the present paper, the calving interval for primiparous cows represents the interval between the first calving and the second, the calving interval for secundiparous females represents the interval between the second and the third, and so on.

The highest mean value of this index was recorded in the first category, 395.13 days and keeps the same dynamic as in service-period case.

Table 3. Length of calving - interval

Category n= 80	Average
Primiparous n=36	395.13 ± 61.73
Secundiparous n=29	374.93 ± 69.06
Multiparous n=15	369.17 ± 92.37
Herd	376.41 ± 74.38

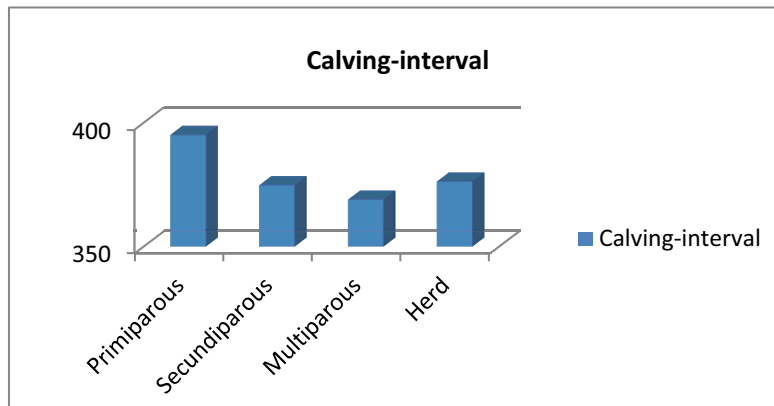


Fig. 3. Calving-interval length

CI recorded per herd a mean value of 376.41 days. Cows calving late in the calving season generally have a lower pregnancy rate because they do not have time to show oestrus early in the breeding season.

This index has been extensively analyzed and reported. It is probably the best index of a cattle herd's reproductive efficiency. Resumption of ovarian activity in the postpartum period does not necessarily lead to conception and methods of stimulating oestrus must be considered in relation to their effect on conception (Holness et al., 1980)

and, indirectly, calving intervals.

Calving interval may be influenced by placenta expulsion time (Choudhuri et al, 1984) and uterine pathology. Hinojosa et al (1980) found a favourable mean calving interval of 383 ±3.7 days (12.8 months) in a well-managed herd in Mexico. They attributed the shortness of the calving interval to the absence of brucellosis, which reduced abortion rate, and stringent culling of infertile cows.

Fertility is the ability of male and female animals to produce viable germ cells, mate, conceive and deliver normal living young (Ensminger, 1969).

Cows require adequate nutrition and rest post calving in order to cycle normally. Conception rate is higher in cows bred 60 days or more after calving. Fertility in cattle is affected by environmental, genetic, disease and management factors which influence the reproductive process at ovulation, fertilization or implantation or during gestation and parturition.

Table 4 and figure 4 present the fertility rate in the studied livestock. The highest fertility rate was recorded in heifers after their first calving, the mean recorded value is 98.21%, comparatively the other categories, 91.17%, respectively 95.23%. The mean value recorded for the whole herd is 95.60 %.

Table 4. Fertility rate (%)

Category n= 80	Average
Primiparous n=36	98.21 %
Secundiparous n=29	91.17 %
Multiparous n=15	95.23 %
Herd	95.60 %

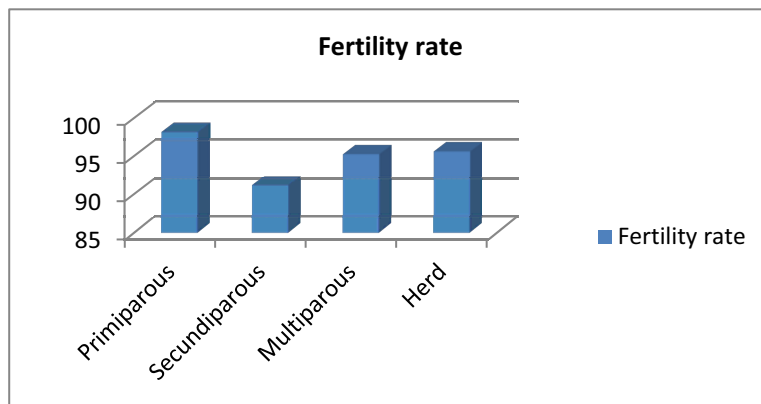


Fig. 4. Fertility rate

The most common estimate of fertility rate is the percentage of mated or inseminated cows that become pregnant (pregnancy rate) or finally calve (calving rate). However, fertility can also be expressed in other ways. For example, Singh and Sharma (1984) referred to two measures of fertility: a general fertility rate, which is the ratio of calves born to females of breeding age, expressed as a percentage; and a specific fertility rate, which measures the number of births within a given group or the total fertility rates of females over their reproductive life. Net reproductive rate was given as the extent to which the female calves of one generation survive to reproduce themselves as they pass through calf-bearing age, expressed as the number of female calves that survive per 100 females of breeding age.

Fertility rates can also be estimated prior to calving as the percentage non-return rate. This is the number of cows bred that do not come back in heat and are thus assumed to have conceived.

This value may be derived at 60, 90, 120, 145 or 200 days after mating (McDowell et al, 1976). Where artificial insemination is employed, fertility rates can be expressed as the number of calves born per 100 inseminations (Macfarlane and Goodchild, 1973).

Progesterone assay now makes it possible to determine conception rates as early as 21 days after breeding. It is also ideal for estimating the magnitude of early embryonic losses. Calving interval can be influenced by the sex of the calf (Plasse et al., 1968). In a study of zebu cows in Kenya, Reinhardt (1978) observed that cows with male calves had a longer calving interval than those with female calves (430 versus 383 days). Subsequently, Reinhardt and Reinhardt (1981) found that dams stopped suckling and therefore weaned, female calves earlier than males (8.8 versus 11.3 months). Montoni et al. (1981) noted that cows with male calves had a calving interval 19.1 days longer than that of cows with female calves. Wilson (1985) calculated 29 days more.

The sex ratio of the offspring in the studied herd is presented in table and chart 5. Following the monitoring of the reproductive activity in the Charolaise herd, it may notice that the ratio male/female is 0.95.

Table 5. Sex ratio

Category n= 80	Males	Females	Sex ratio
Primiparous n=36	16	20	0.8
Secundiparous n=29	15	14	1.07
Multiparous n=15	8	7	1.14
Herd	39	41	0.95

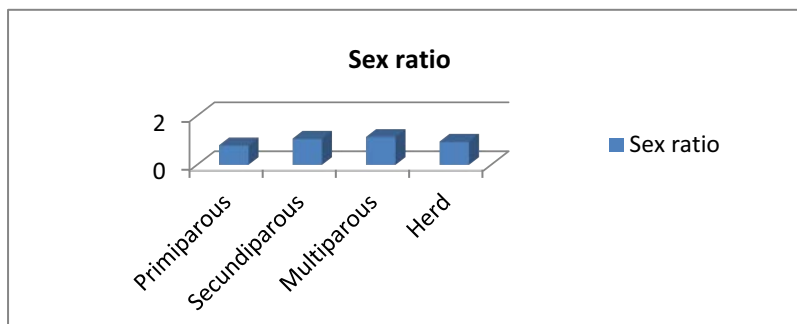


Fig. 5. Sex ratio

4. Conclusions

The length of pregnancy in the studied livestock recorded the lowest values in heifers due to the fact that the effort for pregnancy period is special in this category, they did not recorded a maximum of their body development. Meanwhile, the lowest value of this index in the heifers category appeared due to the higher number of female offspring, the sex ratio being only 0.8.

The recorded values for service period are similar to the ones in the special literature, having the highest value in heifers, due to the fact that the anoestrus period is a large interval. The best value is recorded in secundiparous females, 78.93 days, and the mean value in the studied herd is 87.61 days.

The values of calving interval exceeded the optimum value of 365 days in all categories. Although, if the average value of this index for the whole herd is analyzed, it may notice that the exceeding is not more than 5%, so the number of calves/cow/year is more than 0.95.

The highest value of the fertility rate was recorded also in the heifers, because this category has not a bad medical background related to the genital apparatus. Thus, the best value was 98.21% in heifers, beside the worst mean value in the herd, 91.7%, the difference being almost 7%.

In the whole studied livestock, the sex ratio of the offspring is 0.95, in favour of females.

As calves are the major output, we could mention that the reproductive efficiency is a key factor determining profitability in the beef herd.

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