

Reproductive efficiency as basis for the profit of the buffalo farms in Bulgaria

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The Bulgarian Murrah was created as a milk purpose breed of buffaloes, and it has proved its potential for high productivity in many countries around the globe. But our scope of researches showed that milk yield is not the most important economic trait. In a previous report (Peeva, 2000), was established that with highest economic weight is the trait age at first calving, followed by calving interval.

The economic and genetic losses most often are due to reduced reproductive performance of buffaloes – greatest factor for the profit of the farms.

The objective was to make a descriptive profile of the breeding efficiency of a herd of buffaloes from a farm with mostly natural technology of raising, good management and control of reproduction, as an example of basis for profit.

Material and methods

The observation was conducted on an exemplary profitable farm, located at the Nature Reserve of Rusenski Lom, with buffaloes from the Bulgarian Murrah breed. The farm is well managed with good practices of detecting reproduction related behavior during the day when extensive pasture is available.

The study assigned 61 buffaloes with 312 calvings during the period from 2007 to 2016.

The housing is in tie stalls with exercise yards. A natural service bull is used on the farm, which is kept tied during the night and in the herd throughout the day. The buffaloes are machine milked twice a day, and after parturition calves are not allowed to suckle (separated from dams).

The observation on the reproductive behavior of the buffalo heifers and cows has been done throughout the day simultaneously by two persons – the herdsman. The information has been entered daily in the records books for matings, pregnancies, and calvings.

Fertility rate, expressing number of calves per year, was calculated for the whole herd for each year from 2008 to 2015 (only complete calendar years) as follows:

$$FR = 100 \times \text{number of calves per year} / \text{number of dams in the herd}$$

It concerns the whole data set of the study.

Individual breeding efficiency is expressed as $BE = 100 \times 365 / \text{Calving interval}$.

Conception rate was expressed as percentage of all pregnancies of a buffalo achieved with just one mating (PG_1) out of the total number of pregnancies ($\sum PG$):
 $CR = 100 \times PG_1 / \sum PG$.

The values of FR and CR were averaged for the whole herd for the whole period. They concern a smaller data set – 250 pregnancies of 58 buffaloes.

Results

The data in Table 1 demonstrate the good reproductive efficiency of the studied farm. The value of fertility rate (FR) shows that in the studied period the herd outcomes yearly with nearly 8 calves out of each 10 buffalo cows. The taken period of 8 years is long enough to be representative for that criterion, since there is great variation among the different calendar years – mostly influenced by the number of primiparous buffaloes that enter the main herd during the year (having FR= 100).

While fertility is typical economical trait, with great impact on profitability, breeding efficiency (BE) characterizes biologically the reproductive performance of a buffalo. Actually it gives more realistic view on the female reproduction, without dispersing the data in the calendar year, but giving concentrate information from calving to calving for each animal. It shows that the buffaloes in the studied farm are in very good reproductive status – BE= 91.8%. In this connection, it is noteworthy, that in the whole herd the cases (calvings) with $BE \geq 100$ make 44% of all 250 calvings.

These indicators are highly dependable on the length of the non-reproductive (open) periods of the animals. The information shows that first post-calving estrus averagely occurs in 76 days, while first conception is after roughly 100 days. Noteworthy is that service period, respectively calving interval, is with great economic weight in the construction of the most efficient selection index, developed by Peeva (2000). The data in the observed farm indicates that, if first mating is successful, service period is 79 days, if not, increases by 49 days which affects the profitability. In biological terms, uterine involution normally occurs in 20 to 50 days postpartum, but the greater problem is silent estrus, which might reach 70% of the buffaloes. return to estral activity can take much more time, depending on season, intensity of galactopoesis in the previous lactation, feeding, etc. This economical impact in the studied farm is not as big as in other studies where the per se service period is much longer (Penchev, 1999; Peeva, 2000; Peeva et al., 2011).

Table 1. Reproductive profile of the example farm

Indicators of reproductive efficiency	Measure	Value
Material		
All animals	number	58 (61)*
All calvings	number	250 (312)*
Heifers	number	23
Fertility		
Fertility* = $100 \times \text{number of calves per year} / \text{number of dams}$	%	79.7
Breeding efficiency, BE = $100 \times 365 / \text{Calving interval}$	%	91.8
Cases (calvings) with BE ≥ 100	%	44.2
Buffaloes with 0 cases of BE ≥ 100	%	17.2
Conception rate		
Heifers	%	73.9
Adult buffaloes	%	66.8
• With successful first mating for all pregnancies	%	22.4
• With never successful first mating	%	1.7
Open periods		
Age at first calving	days	1143.6
Calving-to-estrus period (CEP)	days	76.2
Service period (days open)	days	99.7
• When first mating successful	days	78.7
• When first mating unsuccessful	days	128.4
Abortions*	%	1.3
Stillbirths*	%	1.0
Prolapses*	%	1.0

*Calculated on the larger data set

As the selection index implies, the trait with greatest economic weight is age at first calving. Here it comes to 1143.6 days, or 3 years and 49 days. The practice in the farm is the heifers to be exposed to bull when they are well-groomed – body weight of 450 kg, which is usually at two years of age. There are research works showing better reproductive performance of the heifers (Peeva, 1977; Ilieva, 2006), but the management of this farm is towards optimal age of first breeding, since premature breeding of the young animals can be unfavorable, and this reflects on the good breeding efficiency later on.

Another important indicator of reproductive efficiency, with impact on these economically essential traits is conception rate. Of the heifers 74% conceive from first mating, in the adult buffaloes – 67%. This means that less than one third of all animals were bred to the bull two or more times, which in practice is a good attribute. Great portion of the adult buffaloes conceive always from first breeding – 22%.

The incidence of abortion in the studied farm is 1.2%. This relatively low value also contributes for the good reproductive performance of the herd, as it has been established to have impact on calving interval – an increase by up to 162 days (Peeva, 2000), which brings gross financial loss.

In conclusion, as a result of the natural technology, fertility is as high as 79.7 %, accompanied with very low incidence of reproductive abnormalities. This is based on the superb individual reproductive status of the buffaloes, expressed in high breeding efficiency (91.8 %) and conception rates (66.8 %). Hence the very good service period (99.7 days), together with the optimal age at first calving (1143.6 days) being precondition for good profitability.

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