Bulgarian Journal of Agricultural Science, 28 (Suppl. 1) 2022
Agricultural Academy

Study of two different protocols for estrus synchronization in Aberdeen Angus cows in Bulgaria

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Abstract

Malinova, R. & Karamfilov, S. (2022). Study of two different protocols for estrus synchronization in Aberdeen Angus cows in Bulgaria. *Bulg. J. Agric. Sci., 28 (Supplement 1)*, 38–41

Two protocols for synchronization of oestrus and ovulation of cows (n-22) were compared. The Cows which were synchronized were aged between 3 and 5 years, of the Aberdeen Angus breed, bred in Bulgaria. The first protocol was based on a standard protocol for synchronization with PRID delta progesterone device with delayed time of eCG treatment. The second group of 12 cows was under modified OvSynch protocol with extra eCG administered on day 8. We found that the total pregnancy rate for the first protocol was 80% and for the second protocol – 58,3%. The total pregnancy rate was 69.2%. In the first group calving rate was lower – 50%, than the pregnancy rate – 80%. The pregnancy losses observed were 37%. In the second group there were no pregnancy losses – the pregnancy rate and the calving rate in the group were equal – 58.3%.

Keywords: cow; synchronization of estrus;PRID-Synch protocol; Ovsynch

Introduction

The beef cows service in Bulgaria is usually natural-with the use of the bulls in the herds. In the recent years, the reproduction organization in the beef cattle herds has been improved by the application of estrus synchronizations which brings substantial benefits (Chaudhari et al., 2018). The estrus synchronization in beef cows is a powerful tool which may help for the overall planning of the beef calves production (Malinova et al., 2021). The Fixed-time Artificial Insemination Protocols (FTAI) facilitate the wide-range application of the artificial insemination in beef cattle mainly by eliminating the need to ascertain estrus (Bó et al., 2016). The protocols with fixed-time artificial insemination achieve pregnancy rates from 50-60% (Bó & Baruselli, 2014) to 70-90% (Sales et al., 2019). The estrus and ovulation synchronization followed by a fixed-time artificial insemination is an effective method for the introduction of the best genetic material in the herds by means of artificial insemination (Bó and Baruselli, 2014). So as a certain synchronization protocol to be widely applicable, it needs to be cheap i.e. involving less investments and labour, which may be achieved with reduction in the number of manipulations (Bó et al., 2014; Whittier et al., 2013). The cost of the protocols is directly affected not only by the number of manipulations performed but also by the cost of the veterinary-medical materials used (Malinova et al., 2020).

The aim of our study is to examine the effectiveness of two different estrus synchronization protocols with fixed-time artificial insemination in cows of the Aberdeen Angus cattle breed, reared in Bulgaria.

Materials and Methods

The study was carried out in 2020. Protocols for synchronization of the estrus and ovulation of cows (n-22) of the Aberdeen Angus cattle breed, reared in a farm in Kovachitsa, region Montana were studied. The cows were aged between 3 and 5 years, divided into two groups depending on the synchronization protocol. The selection of cows for

the experiment was based on an ultrasound examination and optimal physical status and was performed one month prior the synchronization. The cows selected under the respective reproductive health and optimal physical status criteria were separated in an individual box so as easier observation and manipulation to be ensured in the newly-formed group. All cows in the group were reared separately until calving. The cows included in the trial synchronization were in breeding condition and healthy reproductive system; the stage of estrus cycle was not taken into account. The location of the farm is suitable for breeding a beef cattle. The breeding technology in the building is free- in groups on deep litter bedding. The manner of rearing is barn-pasture. The period when the cows are on pasture all the time is from June until the beginning of November. The farm is single-sector, non-specialized and has a full reproductive cycle.

Two different protocols were developed for the estrus and ovulation synchronization. The artificial insemination of all cows in the groups was performed with a conventional semen. On day 50 after the performance of the artificial insemination, the animals were examined with an ultrasound for diagnosis of pregnancy. A portable ultrasound 'WED3000V with a linear transducer at frequency of 6.5MHz was used for the ultrasound examinations. During the manipulations the animals were fixed in a crush and all requirements and conditions for the performance of the activities were observed.

The pregnancy rates data were statistically processed with the use of MS Office Excel.

Results and Discussion

Two different protocols for synchronization of the estrus and ovulation in cows of the Aberdeen Angus cattle breed were developed and tested for the purpose of the present study. Figure 1 displays Protocol 1 (Pr. 1) in which a group of 10 cows was subject to modified PRID – Synch protocol and timed artificial insemination (TAI) (Figure 1). On day 0, each animal was administered 100 μg GnRH (gonadorelin) or 2 ml OVARELIN® and inserted PRID delta progesterone-releasing intravaginal devices for cows containing 1.55 g progesterone each. The removal of the intravaginal progesterone-releasing devices was performed after they have remained in the vagina for 7 days along with the simultaneous administering of PGF2α (Cloprostenolum). Equine serum Gonadotrophin (eCG) (Syncrostim, 500 IU) was administered on day 8. The artificial insemination was performed at a fixed time on 72th hour after the removal of the progesterone-releasing devices in combination with 100 μg GnRH per animal, intramuscular.

Figure 2 displays Protocol 2 (Pr. 2) for estrus synchronization in which no progesterone-releasing devices were used. The purpose was to examine the success rate of a protocol with a lower cost which could minimize the service expenses of the same type and number of manipulations. Each animal was administered 100 μg GnRH or 2 ml OVARELIN® on day 0, on day 7 the cows were treated with PGF2α, and on day 8 with eCG, 500 IU. The artificial insemination was carried out on the 10th day after the initiation of the treatment, and 100 μg GnRH was administered once again. 50 days later the cows were examined with an ultrasound for the diagnosis of pregnancy.

Table 1 displays the results of the application of the two examined synchronization protocols in cows. The average pregnancy rate of the two synchronized groups was 69,2%. We ascertained that in Pr. 1, where progesterone-releasing devices were used, the pregnancy rate was considerably higher- 80% unlike in the second scheme – 58.3, with no significant differences reported. Protocol 1 was a modified variant of one of the protocols examined in a previous ours study in which the pregnancy rate was 75.6% (Malinova et al., 2020). The only difference between the two schemes was that the eCG treatment was put back by one day so as hyper stimulation of the ovaries and a potential earlier ovulation in some of the animals to be avoided. Nevertheless, the difference between the results of the two protocols was insignificant and it may be due to other factors. The values reported

Fig. 1. PRID delta-based protocol for synchronization (Pr.1) of the estrus and artificial insemination with a fixed-time artificial insemination (FTAI) in beef cows of the Aberdeen Angus cattle breed

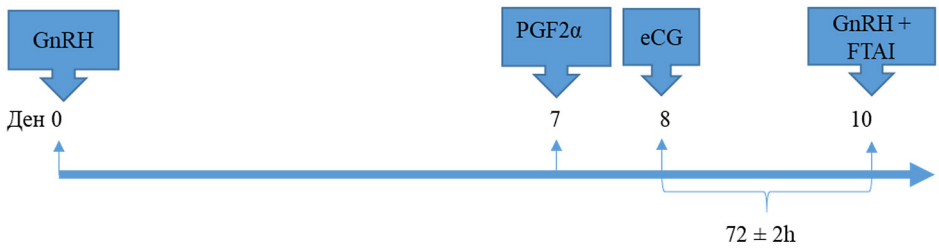

Fig. 2. Protocol for estrus synchronization and artificial insemination (Pr.2) with a fixed-time artificial insemination (FTAI) in beef cows of the Aberdeen Angus cattle breed

Table 1. Pregnancy rates upon testing of schemes for estrus synchronization in cows of the Aberdeen Angus cattle breed

Protocol	N	Pregnancy rate, %	Calving rate, %
1	10	80.0	50. 0
2	12	58.3	58.3
Total	22	69.2	54.54

for the PRID- delta protocol correspond to most of the studies. Bó & Baruselli (2014) ascertain stability in the results of the estrus synchronization with protocols in which control is exercised over the follicular growth and estrus; they mark pregnancy rates of approximately 50-60% for a period of 10 years. Another study of Randi et al. (2021) shows that the use of GnRH and the application of artificial insemination in beef cattle results in pregnancy rates within 49-54%.

The purpose of the second protocol studied was the examine the possibility for application of a modified OvSynch protocol in beef cows. The additional treatment of cows with eCG on day 8 was main difference in this protocol from most of the protocols of this type applied. The pregnancy rate achieved after the implementation of this protocol (58.3%) was higher than that reported by a range of authors after the implementation of OvSynch protocols. Under similar protocol, Geary et al. (1998) ascertain a pregnancy rate of 54%, Hon et al. (2018) also report results close to ours- 57.1%. Cabrera et al. (2021) achieve pregnancy rates from 30.3% to 42.6% upon examining protocols of this type but with reference to dairy cows.

Upon accounting the calving rate, we ascertained that it was relatively low in group one – 50% i.e. there were pregnancy losses. No pregnancy losses were observed in second group where the pregnancy and calving rates of the group were equal – 58.3%. Due to the fact that the pregnancy diagnosis was carried out late- on the 50th day after the artificial insemination, the pregnancy losses after this period may be classified as fetal deaths. Santos et al. (2016) report pregnancy losses from 5.4 to 12.4% in the different groups. Less than 6% pregnancy losses are observed in beef cattle after the first month of pregnancy and they are mainly due to the environmental factors (Reese et al., 2020). The reasons for the high pregnancy losses rate need to be further investigated.

Conclusion

Two protocols for estrus synchronization in cows of the Aberdeen Angus cattle breed were studied and the average pregnancy rate after the synchronization performed was 69.2%.

We ascertained that the pregnancy rate after the first protocol involving PRID – delta device was higher – 80%, than in the second one – 58.3%.

Upon reporting the calving rate of all cows included in the synchronization, it was ascertained that the calving rate of the first group was considerably lower. Medical examination detected pregnancies in 8 of 10 inseminated cows, and of those, only 5 calved. All cows from the second group which were diagnosed with pregnancies calved i.e. the pregnancy and calving rate of the group were equal – 58.3%.

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