MOET Utility in Beef Production Strategies

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Abstract
The paper presents the reason of beef production for human food security and the necessity of special dairy and beef breeds in order to balance the milk and the meat production in cattle farming. That is a difficult target for many countries since they don’t dispose of large natural pastures to extensively feed the beef cattle herds. At the same time many European countries breed only dual purpose cattle breeds. So the idea of intensive farming with beef breeds or crosses is developed. To speed up this kind of programs Open MOET (Multiple Ovulation Embryo Transfer) Farm technology is proposed and it is completed with the needed facilities for production and preservation of embryos. Concerning the MOET Farm which confers directly pure bred beef calves, emphases is put on veterinary quarantine and heifer receptors conditioning. Concerning embryo conservation the direct transfer (DT) technique is recommended. Modalities of integrating dairy farms and beef cattle farms are finally discussed as recommended strategy for Romanian Agriculture.

Keywords: beef cattle biodiversity, beef cattle farming, beef production strategies, intensive farming, MOET in cattle

1. Introduction

Food security of humans became more and more stringent since human population measures more than 7'000'000'000 of souls. Among foods for people meat is the most important one it while contains the essential amino acids needed for human nutrition. Beef covers about one third of the total quantity of meat consumed on the Earth. Being produced by large ruminants, beef production requires fibrous feed stuff for producer animals. Thus no competition with human consumers is involved. For these reason increasing of beef production is one of the main target of the promoted food security by FAO. But cattle are producing both milk and meat. The common dual purpose cow producing, let say, 4000 kg of milk per year and a 0.8 kg of live body gain per day ensures the milk for 20 humans and the beef for only 7 human consumers [1]. These figures result from considering 200 kg of milk and milk products and 20 kg of beef as satisfactory for a good standard of life. Concerning the beef production a 48% of meat out of the body gain of one year was considered. So there is a gross misbalance between the milk production and meat production in cattle. That one can’t be excluded by selection since the two traits involved are contrary correlated. The solution was to have beef cattle that aren’t milked. But that required lower costs of housing, feeding and breeding cattle [2]. So in the older time beef cattle were kept out door, fed on natural pastures and bred by natural mating. Now days there are special beef cattle breeds able to show more muscle and use better the feed or to get impressive body weight.

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The future strategy of the food security demands a good balance of dairy and beef cattle, special breeds for extensive and for intensive beef production with good improvement programs of their traits and better management of extensive or intensive keeping of herds. These targets are valuable for all the countries of the world [1].

2. Materials and methods

The content of the present paper is based on the “Project Study Concerning an Incubation Open MOET Farm” [3]. That is the PhD Thesis of the first author above. It exposes the main components of a farm aiming to incubate pure beef bred embryos needed to populate beef cattle farms and how operate to use part of dairy livestock of a farm to produce beef progeny. The estimations and the discussions developed in the paper are based on the results obtained by the first author in his doctor thesis.

3. Results and discussion

Open MOET Farm is an enterprise designed to incubate preserved cattle embryos. Opposite to the Closed MOET Farm [4] which is a complex enterprise using the dairy ET heifers it produces as receptors for the embryos they are producing them self in order to get valuable candidates for progeny testing the Open MOET Farm uses bought genetically non valuable heifers as surrogate mothers (receptors) for genetically valuable embryos of dairy or of beef cattle furnished by specialized units disposing of very valuable sires [3]. So foundation of an Open MOET Farm is not a difficult task. Such farm has a quarantine sector for bought young heifers, a growing sector for the yearling heifers, a service sector where embryo transfer is provided, a sector for surrogate mothers where the pregnant heifers are kept, a long term maternity with the nursery for the new born beef calves resulted from ET, up to they are wined and sold.

From our former experience is better to buy young heifers soon after wining when they are cheaper. The quarantine must last 60 days. During this time they must be kept in small boxes of up to 5 heads with free access to forage and water. There is no need to fed concentrates to heifers. During the growing period heifers may be kept in larger groups of similar age. The age difference inside a group must be three month less. If the farm is large enough it is better to have groups of heifers born in the same month [5]. That allows maintaining the same composition of the groups and avoiding the stress created by the presence of new herd mates. When in service it is necessary to discover when heifers enter in heat and to synchronize the day of the cycle to the age of the embryo when transfer of embryo is done.

The long time maternity is so called because, in order to reduce costs, it is possible to allow calves to suck their foster mothers. In the above cited study [1] a total number of 20 heifers were prepared to be become receptors of embryos. They have been 80% of the adult cow body weight when inseminated and were synchronized for heat. All of them undertook transrectal examination. Two of them were excluded as suspect of pregnancy. A number of 9 heifers presenting active yellow body have been marked and received a PGF2α injection after 7 days. The other 9 received a synromate implant and 100 mg of GnRH. The implant was extracted 7 days later when also they have received a new dose of GnRH [5]. All 18 heifers have shown heat within 48 hours form the last injections and the transfer of embryos has taken place after 7 days from the estrus. Direct transfer was promoted in 12 heifers and 7 of them became pregnant and calved. Other 5 heifers received frozen embryos under glycerin protection that were washed 10 times before implantation [3]. One heifer was excluded because she presented to of a small yellow body.

The success of direct embryo transfer (DT) has been 58.33% since 7 heifers out of 12 have calved 3 females and 4 males. The success rate of transfer with frozen embryos under glycerin protection has been 40.0%. Out of 5 inseminated heifers 2 of them have calved 2 females [3]. There is here a clear argument about the importance of embryo breed for the body weight and of cause the size of the new born calves (Table1).
Tabel 1. Results of embryo transplantation

<table>
<thead>
<tr>
<th>Crt. Receptor no.</th>
<th>Receptor heifers</th>
<th>Receptors’ birthday</th>
<th>Pregnancy lengths</th>
<th>Bred of calves</th>
<th>Sex of calves</th>
<th>Weight of calves</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 97072</td>
<td>21.12.99</td>
<td>278</td>
<td>HF</td>
<td>M</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>2. 97134</td>
<td>05.12.99</td>
<td>262</td>
<td>HF</td>
<td>F</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>3. 97152</td>
<td>21.12.99</td>
<td>278</td>
<td>HF</td>
<td>F</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>5. 97246</td>
<td>26.12.99</td>
<td>283</td>
<td>HF</td>
<td>M</td>
<td>46</td>
<td></td>
</tr>
<tr>
<td>6. 97308</td>
<td>20.12.99</td>
<td>277</td>
<td>HF</td>
<td>F</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>7. 97322</td>
<td>24.12.99</td>
<td>281</td>
<td>HF</td>
<td>M</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>8. 97172</td>
<td>21.12.99</td>
<td>278</td>
<td>Jersey</td>
<td>F</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>9. 97208</td>
<td>21.12.99</td>
<td>286</td>
<td>Jersey</td>
<td>F</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

\[ \bar{x} = 39.4 \pm 2.0 \pm 0 \]

When calves are winched the former receptors is better to be sold. We counted that to feed a cow 12 month to get a calf out of embryo transfer is more expensive then to rear a heifer that growths and put weight.

The financial gross margins in the mentioned study were positive (about 72.20% of the variable costs) due to the low price of the bought heifers and to the kind of feed they need to grow. The estimated gross profit was 27.62% to the sum of variable and fix costs [7]. It might be expected the Open Moet Farm with beef cattle to be profitable as well since the price of beef cattle embryos is much lower than the price of dairy cattle embryos, even the farm output will be smaller. Higher efficiency of the Open MOET Farm could be obtained if the Gordon’s idea of inseminating two embryos to each heifer in order to obtain twins [6]. Of course the operation has to be sustained by the flushing of heifers after insemination as Gordon said.

The possibility of completing the farm with an ET Laboratory to have an own production of frozen beef cattle embryos is not excluded, but that will require to have a well trained team in the field.

One more sophisticated program to apply MOET for beef production is using the heifers of commercial dairy farms as receptors for beef embryos. Such a program requires to rear all the heifers of the farm up to the economical sexual maturity [8]. Then when they will come in heat will be used as receptors of beef [5].

This way selection of the most productive dairy heifers is promoted without the risk of losing good heifers if they are sold before the first parturition. At the same time for an annual fertility of 80%, in the dairy farm for 100 cows 40 young heifers, before first parturition will be present. They will give birth to 40 beef calves that can be grown up in intensive system for good quality beef production. Or it is possible to send the resulted beef heifers to increase the livestock of beef cattle herds. The first way of acting could use massive beef breeds since calves are reared in closed environment. The second way is a good solution for producing beef on natural pastures.

The great advantage of practicing MOET for obtaining beef calves in dairy is no need of investment [8]. At the same time at least one quarter of the beef production of the dairy farm, if not a half when female calves are slaughtered, is of better commercial quality and sold cattle embryos at better price. The heifers with unsuccessful transplantation will be tried again since become pregnant. After parturition they will be milked and knowing the 100 days production of milk a selection decision is taken. If the heifer is retained in the farm will be normally inseminated and further will give birth to dairy calves. If the heifer will be not accepted in the dairy herd will be sold.
4. Conclusions

Food security of the future will press for specialized beef cattle herds or dairy cattle herds, in order to balance the milk and the meat production of the species.

MOET techniques developed in dairy cattle might be applied to build up pure bred beef herds without new scientifically achievements.

New progress could be expected from Gordon’s procedure for inseminating two embryos to one receptor in order to obtain twin calves.

MOET could be applied also in commercial dairy farms using the dairy heifers as receptors of beef cattle embryos to obtain calves for intensive beef production when farmers don’t dispose of large natural pastures.

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