

## TECHNOLOGY OF BOVINE FINISHING FOR BEEF PRODUCTION

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**Abstract:** Beef is an important product from bovines: it is particularly appreciated for both its nutrient content and its dietary features that are unanimously acknowledged, and for the increasing share of bovine raising profitability (it shares over 30% of the world meat production). Bovines also supply convenient meat from the point of view of production costs because they valorise a wide range of fodder that are increasingly easy to get and inexpensive. Bovines from precocious breeds fatten faster and deposit large amounts of meat and fat compared to bovines from demi-precocious and late breeds. Yield upon slaughtering, meat tenderness and succulence are higher in precocious animals. Rational and well-balanced nutritiously feeding results in higher quality meat of high calorie value.

**Keywords:** meat, production, finishing systems, feeding, watering

### INTRODUCTION

Beef is an important product from bovines: it is particularly appreciated for both its nutrient content and its dietary features that are unanimously acknowledged, and for the increasing share of bovine raising profitability (it shares over 30% of the world meat production). [3,5,6].

From the perspective of chemical composition, beef is a complete food containing 36.2% dry matter (18.7% protein 15.3% fat), 1,800 kcal/kg and all the essential amino acids and almost all vitamins [1,4,7].

Bovines also supply convenient meat from the point of view of production costs because they valorise a wide range of fodder that are increasingly easy to get and inexpensive.

Castrated males yield lower increases based on higher specific consumption, but they produce better beef than young bulls, but inferior in quality to that of females.

Females reach, upon slaughtering, lower yields and smaller carcasses, but their meat is more persilated and marbled, finer, more tender, more succulent, lighter in colour and with pleasant taste and aroma [2,8].

### MATERIAL AND METHOD

For this paper, we used information regarding beef production and bovine finishing systems appealing to information bulletins, publication in the local media, literature books, and statistics by specialised institutions.

### RESULTS AND DISCUSSION

Bovines from precocious breeds fatten faster and deposit large amounts of meat and fat compared to bovines from demi-precocious and late breeds. Yield upon slaughtering, meat tenderness and succulence are higher in precocious animals.

Rational and well-balanced nutritiously feeding results in higher quality meat of high calorie value. Taking into account the fodder assortments used, we distinguish several types of feeding: “volume”, predominated by fibber and succulent fodders and used mainly in adult bovines, reformed bovines and young bovines aged over one year and half, produces lower cost beef but of lower quality; “concentrated”, a feeding type specific to intensive young bovine breeding, where concentrated fodder shares over 50% of the nutrient value of the rate, ensures high daily weight gains (900-1200 g/head/day) and high

quality beef at higher costs; "lactate", used to fatten calves and is used almost exclusively, ensures high weight gains (over 1,200 g/head/day), a high yield upon slaughtering (60-62%), a large share of meat in the carcass, exceptional organoleptic features, but at high costs (in most cases, the meat produced does not cover the production costs).

Green matter and hay favour higher beef with particular organoleptic features; concentrated fodder influences positively meat colour, marbling, persilating, and all other organoleptic features; silo fodder results in higher water content meat, soft consistency and darker colour.

Bovine raising supposes one of three fattening systems: intensive, demi-intensive and extensive.

Intensive fattening generates the best results materialised earlier and at larger weights, higher yield upon slaughtering, a favourable ratio between macro-components and meat with higher organoleptic features.

Demi-intensive fattening ensures low results than the preceding system, weight gains smaller with about 25% increased feed consumption, yield upon slaughtering smaller with 5%, and a higher suet index.

Extensive breeding achieves the lowest meat production indices materialised in both meat amount and meat quality and economic benefits.

Total meat production is influenced by the following factors:

- The number of bovines slaughtered: it correlates directly proportionally with meat production and represents an extensive factor in increasing meat production. The number of animals being limited by the possibilities of ensuring fodder, increasing meat production can be done by increasing the number of products per reproduction female, by increasing selection intensity, by optimising the gender ratio, by reducing the share of necessity reformation, and by using reformed cows in industrial crossing.
- Mean weight upon slaughtering: it is an intensive factor in increasing meat production. Mean animal weight upon slaughtering at world level is 350-400 kg. To produce larger amounts of meat we need to slaughter young animals at body weights above 450 kg and in adult animals at body weights above 600 kg.
- Yield upon slaughtering: in bovines, it varies depending on breed, age, gender, fattening system, and fattening state.

Beef cattle breeds (Hereford, Shorthorn, Aberdeen-Angus, and Santa Gertruda) reach a slaughtering yield varying between 60-70%, dual cattle breeds between 52-60%, and dairy cattle breeds reach between 38-46%.

Beef production can be reached in three fattening systems – extensive, demi-intensive and intensive – each of which has its own features.

**Extensive fattening system technology** is increasingly rare on households with small numbers of animals because of technical and economic issues. It is based on keeping the animals on natural grasslands and feeding them on volume fodder only, with no addition of concentrated fodder.

The rate of daily weight gains is 400-600 g/head/day, which corresponds to a specific consumption of 8-20 NU/kg of weight gain. In this case, young animals aged over 12-13 months and adult animals are subjected to fattening for 5-6 months.

**Demi-intensive fattening system technology** relies on using, in animal feeding, volume fodder and by-products from the food industry supplemented with moderate amounts of concentrated fodder.

It has the advantage of using cheap assortments of vegetal and food industry products, by-products, and that cannot be used directly in humans' food. Structurally, the fattening period is divided into three sub-periods:

- Preparation aims at overtaking, receiving, transporting, grouping, quarantining, and getting animals used to the progressive consumption of the fodder that will be the basis of fattening rates: it lasts 15-25 days;
- Fattening proper is characterised by a share of the basic fodder of 65-70% of the daily rate value: its duration varies depending on the weight gain and on the weight target upon slaughtering;
- Finishing is the last part of the fattening process where volume fodder is reduced in favour of concentrated fodder: this is the period when improving animals' commercial quality, meat's commercial quality (marbling and persilating of the muscle tissue), and improving the slaughterhouse indices.

From the perspective of the basic fodder used, in practice they know several variants of demi-intensive fattening:

- Fattening based on green matter is practiced in agricultural units relying on rich grasslands and enough amounts of green matter from their own cultures. Depending on concrete conditions, this fattening system can be used on grasslands alone, on grasslands and with additional green matter, on grasslands with additional concentrated fodder, on mowed green matter with additional concentrated fodder. No matter the variant, the following need to be observed on a daily basis:
  - Ensuring the necessary mineral supplement of calcium and kitchen salt;
  - Ensuring water sources, shade and troughs with supplementary concentrated fodder on the grasslands;
  - Grouping animals on the grassland depending on gender and dividing the grasslands to be grazed (grazing should not last more than seven days for 12-14 h/day);
  - Castrating young bulls about 20-25 days before taking them to the grasslands;
  - Maintaining the grassland for about 100-150 days and using preferably young cattle aged over 12 months to achieve a weight gain of 700-800 g/head/day, corresponding to a specific consumption of 7.5-10 NU/kg of weight gain.

Results obtained in Romania in this fattening system show that the highest daily weight gains per capita were in young cattle aged 12-14 months (400-700 g) compared to young cattle aged 6-12 months (300-600 g) fattened only on good quality grasslands. On poorly productive grasslands, we recommend the introduction of a supplement of concentrated fodder. The period of fattening on the grassland is followed by a variable period of fattening in closed barns and free maintenance, on permanent bedding, feeding the cattle with green matter at will and a supplement of 2-2.5 kg of concentrated fodder.

- Fattening based on succulent fodder is practiced, in general, during winter using, the most frequently, silo maize as a basic fodder, but other succulents can also be used (demi-silo of grasses, beetroot, pumpkins, beet noodles, husks). The age of animals in this type of fattening should be minimum 6-7 months but the best results are in animals aged above 12 months. The share of silo fodder should not be over 50-55% of the nutritive value of the ratio, the rest being fibber fodder and concentrated fodder ensuring the daily necessary minerals. Thus, we can get daily weight gains of 700-900 g/head/day, for a specific consumption of 8-9 NU/kg of weight gain.
- Fattening based on fibber and roughage fodder is used particularly in mountain areas (great hay producers) and in field areas (producers of large amounts of cobs, straw and other vegetal wastes).

Fibber and rough fodder can be part of the ratio representing 50-55% of the total nutrition units and can be administered chopped. To complete the necessary protein, we can use urea (30-35 /100 kg live weight). Urea can be prepared in a ratio of 1: 9 with molasses diluted with water in the same ratio of 1: 9.

Straw and cobs chopped previously shall be sprinkled with such a mixture and using them in the feed shall be done only 10 h after sprinkling. It is very important to ensure the necessary minerals among which sulphur plays an important role in ratios of 1: 10 – 1: 12 with urea and a minimum amount of 0.5 kg hay/100 kg live weight.

**Intensive fattening system technology** of cattle is done in specialised units that allow organising and mechanising production processes with maximum efficiency. This fattening system has the following features: it uses biological material from beef cattle breeds or from dual-purpose cattle breeds or their half-breeds, an intense nutrition regime with balanced ratios structured in accordance with the demands specific to each age, sheds specific to each age, specialised staff, and modern raising technologies.

Reception of animals subjected to fattening can be done at small ages (about 3-4 weeks after birth) from proper farms based on a contract regarding the flow; minimum conditions for reception should include a good health state, proper body conformation, and particularly getting the young ones with a milk surrogate supplied in buckets.

After reception, animals are grouped depending on age and weight and are accommodated in organised sheds previously prepared through mechanical cleaning and hygienisation.

In general, the intensive fattening system is structured in three phases, each of them having its own features:

- Phase I (breast feeding – weaning) lasts from reception age to the age of 70 days. Animals are kept in collective boxes on permanent bedding or on grill flooring, benefitting from 1.3-1.4 m<sup>2</sup>/head. On the wall siding the feeding alley, the boxes have concrete mangers for fibber and concentrated fodder with systems for the blockage of animals' heads and with devices for the fixing of buckets with milk substitutes. Watering is done through common waterers (one per box) and waste removal is done mechanically with a scraping blade. The basis of animal feed is milk substitutes, alfalfa hay and high quality concentrated fodders *ad libitum*. This type of feeding can result in a daily weight gain of 700-800 g/head. Animals are weaned about 10 days before being transferred in the “all full – all empty” system and after vaccination.
- Phase II (raising – fattening) lasts about 190 days in large halls, free range, in collective boxes with grill flooring. Animals should benefit from 2.0-2.5 m<sup>2</sup>/head until they weigh 350 kg and 3.0-3.5 m<sup>2</sup>/head until they weigh more than 350 kg. Watering is done *ad libitum* using common waterers (one per box) and waste removal can be done hydraulically or mechanically. On the wall delimiting the feeding alley, the boxes have concrete mangers with feeding metal grills (20 cm/head). Feeding shall be done *ad libitum* with high quality volume fodder (fibber and succulent) and concentrated fodder as unique mixture supplied with a technological trailer; thus, animals can gain 1,100 1100 g/head/day.
- Phase III (fattening – finishing) lasts 140 days, when animals reach over 450 kg corresponding to a weight gain of over 1250 g/head/day. Animal maintenance is done in hall sheds in collective boxes with armed concrete grill flooring. The wall delimiting the box and the feeding area has concrete mangers with metal feeding grills (25cm/head). Animal feeding is done *ad libitum*, with 2-3 fodders or with unique fodder, with ratios that ensure the planned weight gain and the

improvement of meat organoleptic features. Watering is done *ad libitum*, through common waterers with constant level (one per box) and waste removal is done mechanically with a scraping blade or hydraulically. When finishing, delivery is done entirely, according to the “all full – all empty” principle, avoiding making up new lots of animals that have not reached valorising body weight. After depopulating, sheds are subjected to mechanical hygienisation and disinfection aiming at populating again.

### CONCLUSIONS

Beef is very much demanded in human consumption because of its high biological and nutritious value; it is succulent and it has a pleasant colour, aspect, smell and taste and is widely used in gastronomy.

To increase yields upon slaughtering, we need to implement modern technologies based on biological material with a high fodder conversion rate and producing during the first fattening period large amounts of protein.

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