

The Production of Goat Milk under Organic Requests

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Abstract

Organic farming has turned into a very important subject who consists in a food production label and it has become very popular. That is because, especially in the EU the majority of the dairy goat farms want or have already applied the organic farming in order to benefit not only from the good price of milk but also from the given positive image. The main issue of this study is the high production of goat milk using organic farming under specific regulations. Therefore, the organic farming is based on a safe environment, 100% organic feedstuffs, healthy animals (by prevention of diseases), natural mating, reduced stress in animal rearing, modern stables and milking equipment. A few feeding rations were established to improve the quantity and quality of goat milk.

Keywords: Organic farm, classic farm, conversion, milk goat

1. Introduction

The study was conducted in the period of 2008-2010 and followed the assessment of milk production, potentially ecological, the goats being discussed topic worldwide, in terms of food production (Organic Monitor 2008).

Production, processing, packaging, transportation and marketing of organic products are influenced by the well defined principles and regulations (FAO 2000, 2005 IFOAM, [1], FAO / WHO 1999), [2] In organic agriculture an important standard is 2092/91/EEC (January 1, 2009:834 / 2007/EC) of the EU [3]. All organic products made and sold must meet the national governmental standards specified in these regulations. Crop rotation, feed and nutrition, way of development, of increasing health, hygiene, inspection and certification are part of the ecological agriculture standards.

kept in places that meet environmental standards, in modern stables with access to the grazing season (April-October) and the rest, the food is supplemented with fodder obtained by the farm. Organic agriculture has become a widely

2. Materials and methods

The study was conducted on two farms in the area of Sibiu, one respecting organic standards, and other based on the classical methods principles. There were taken for study a total number of 30 goats belonging to the Carpatina breed, near Sibiu. The research followed to convert the classical methods into organic methods. The experiment aimed to increase the production of goat milk by certain strategic "systems" such as land quality influence on livestock (to increase milk production, organic standards require the opening to grazing of livestock), animal feed (an organic growth is an organic feed), veterinary treatment of animals (if case of disease it is not allowed any type of treatment, much less based on antibiotics). It is instead allowed to have those vaccines

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containing the GMO, management practices (regardless of what action is exerted on the reference animals it is aimed not have a negative effect on them and avoiding stress), housing and lashing rates (to each animal it is assigned a certain space taking into account the degree of development: adult 1.5 m², kid 0.35 m²), inspection and certification (follows the actual conversion which takes about 24 months), organic goat milk production in accordance with organic standards (which is actually the reason for converting organic goat milk and having a high quality it is more expensive), milk production (milk yield is influenced by the type of feed so that if food is based on a larger amount of solids, and a small quantity of water, milk production is low), the health of the animal (somatic cells count must be according to the current regulations. A larger number leads to a devaluation of milk).

Determining the number of somatic cells (SCC) by the Petrifilm method

The number of somatic cells from the homogeneous milk samples was determined by chemical and electronic methods [4].

Principle: The first step is spreading a quantity of tested milk on a slide, until a film is obtained. The next steps are: drying and staining the film of milk and then the counting of stained cells using a microscope and multiplying the result calculated on a defined area by the percentage of work which allows the determination of the number of cells per milliliter.

Results Calculation

With a microscope, the cell nucleons are counted in the film (at least 400). The length of the numbered strips should be of 5 mm. The width of the strip corresponds to the diameter of the microscopic field. At an outlet of testing of 0.01 ml the work coefficient W1 is calculated, using the following equation:

$$W1 = (20 \times 100) / d \times b$$

Where: d = diameter in mm of the microscopic field; b = number of fully counted strips.

The number of counted somatic cells is multiplied with the work coefficient (W1) on an ml of milk.

3. Results and discussion

A. Practice Management

Unlike the classical growth of goats, the organic one requires a reproduction of goats based on

natural breeding, and sometimes relying on artificial breeding, with the condition that the embryo cannot be transferred. In classical case, such transfer is allowed.

In the case of organic growth any action of cruelty is prohibited. Also, the dehorning of goats is done only in accordance with the approved certificates of hygiene, animal welfare and biosecurity aspects.

Both in classical and organic practice, the castration is allowed but the ecological standards require that it must take place at a very young age (<1 month) and only under veterinarian anesthesia. In both cases it is recommended for ruminants to live together in groups in order to meet the social needs.

Organic growth requires the decrease of animal stress during loading, transport (after loading, the goats are verified after an hour and thereafter at intervals of 2-3 hours, the maximum temperature is 30-45°C) and downloading using allopathic tranquilizers or electric shocks.

Table 1. Environmental standards on space for animals during transport

	Weight(kg)	Area(m ² /animal)
Carpatina Breed	< 35	0.20 – 0.30
	35 - 55	0.30 – 0.40
	> 55	0.40 – 0.75
	<55	0.40 – 0.50
Pregnant goats	>55	>0.50

B. Animal feeding

The goats must be fed with 100% organic food, of which 60% roughage (straw, cobs, haulm of vegetables).

Very important was also the kids feeding topic. Kids should be fed for 45 days with natural milk, preferably maternal milk. A substitute in livestock may be the cow milk.

Regarding the food of animals there is allowed: vitamins, provitamins, minerals, and in the cold season (winter) the artificially produced vitamins. It is not allowed to use in organic farming the products which are based on GMO and other derived products.

It is recommended but not mandatory for ruminants to feed freely, in suitable weather conditions and with a rich grazing. In both farms: organic and classical, the

permanent access to water and food must be possible for all animals.

C. Homes and stocking rates

If in the classical methods of growth grazing is the underlying method of feeding, in the case of organic methods this is not always possible. In this situation it is imperative that the animal should be kept in ventilated places with permanent access to fresh air, these being the required rules of organic standards. Restraining animals by tying is prohibited.

The classical method does not require a well-defined space given to each goat, while the organic method gives a very high importance to this issue. For the goats kept in bordered spaces it is allocated a minimum space of 1.5 meters for an adult goat and 0.35 meters to kids, and for those reared outdoor the required surface for adult is 2.5 meters and 0.5 meters for the kid (2092/91 / EEC Annex VIII). Organic growth also requires that a box must be made of maximum 50% floor area or grid stable and the rest of a non slippery material. The boxes also need to be filled with organic material (straw, hay).

D. The connection between arable land and animal husbandry.

The focus in the organic farms is on breeding animals with grazing. The growth in bordered spaces is non-organic and prohibited.

E. Veterinary treatment of animals

In the case of organic livestock it is recommended the prevention rather than cure of the diseases.

It is believed that local breeds are robust, easily adaptable and tolerant to disease. Concerning the healing of certain diseases, treatments with chemically synthesized allopathic veterinary medicinal products or other antibiotics are prohibited. It is instead allowed the vaccine with GMO-based products.

Animal disinfestations are performed only at the doctor's advice when he considers that the infection may respond to treatment. The treatment based on natural methods is applied to the animal as long as it has a beneficial effect on it, but if it does not give the desired results there are also allowed the antibiotic treatments. [5]

Unlike the goats from the organic farm, the ones from the farm classical farm can be treated, in case of illness, with allopathic chemical of synthesis medicines, even with antibiotics when they do not affect the milk production. Also, in the case of organic livestock, if the animals are

subjected to more than three times under medicine treatments, the production cannot be sold anymore as organic. In comparison to the conventional farm, the organic one, after the medicine treatment all data related to health is stored to be submitted to inspection. [6]

F. Goat milk under organic production request

Studies concerning the ecological quality of goat milk and dairy products have existed since 2003, being conducted by the German Federal Institute of Organic Farming, taking into account all ecological standards and the season's influence. An organic growth requires a large contribution of management in agriculture and also a higher intensity of work in the manufacturing sectors. This is the reason why the organic products are more expensive than the conventional ones. Within the plan GAK during 2010-2013, the promotion of organic cultivation methods takes the following form under the principles that regulate the marketing promotion and the suitable land management website (MSL): Bio-Siegel is an important step in developing the organic market. The label can be used on a voluntary basis. The basic standard set by EC legislation which regulates the organic farming and also giving up to the procedural measures, such as the procedures for assignment or licensing, enables the widespread use of the label for products from other EU states and third countries as well. Community law does not allow a state label that goes beyond the standard set by EC legislation which regulates the organic agriculture. [7]

According to the conducted studies it was found that organic goat milk has a higher quality, compared with the one from the animal raised by classical methods, and thus is considered to have a higher price (conventional milk = 0.95 €, organic milk = 1.42 €).

The price of goat milk is influenced by certain seasonal differences: the transition period (March-April, September-October = +0.3 €), summer period (May-August = +0.29€), winter period (November – February = +0.39€).

The price of goat milk, in addition to seasonal influences, it is influenced by fat content (+0.08 %€), protein content (+ 0.095% €). The milk with a low content of somatic cells is quoted with a higher price.

Lately, it is aimed to shift from traditional methods of goat growth to organic methods just because of the earned higher profits in milk

production, organic milk is reaching around 1.42 €/l.

As the price is positively influenced by some factors (seasonal influences, fat and protein content, etc.) it can be also influenced in a negative way during transport (€ -0.13/l) and when SCC bacteria is found in large amount.

G. Food

In Romania there are available 30 acres of pasture for ruminant feeding. Floristic composition has dominant species like *Poa trivialis* (7-40%), *Alopecurus pratensis* (0.5 - 25%), *Festuca Pratensis* (0.5 - 3.5%) and *Taraxacum Officinale* (0.3 - 21%). Goats go to pasture in April till October. The surplus is used for grass hay production. In the winter hay exists in a large amount. A hay of good quality represents an important source of digestible protein 140-150 Cp (high biological value), vitamins and minerals, being the main forage in the diet of the herbivorous animals throughout the entire period of calving. [8] The daily food ration of animals cannot be based solely on hay, being supplemented with some concentrates and it is being influenced by several factors: transport, period of lactation, gestation period, after calving period. During this time goats are traditionally fed with different types of hay, concentrated only in the first month of lactation in amounts of 200-300 g/day. After the current food rules in our country, for a goat of 50 kg in weight, in the first three months of pregnancy, there must be ensured: 1 UNL (unit nutritional milk), 45-50 g PDI (protein digestible at intestinal), 3.5 g Ca, 2.5 g P, 1.5 g Na. For a goat of 50 kg weight, pregnant with two kids, after the official food rules there should be ensured in the fourth month: 1.35 UNL, 67 g PDI, 6 g Ca, 3.4 g P, 2 g Na and fifth months: 1.73 UNL, 90 g PDI, 8.5 g Ca, 3.7 g P, 2g Na. It was given a quantity of 98 kg concentrates to a total of 30 goats. Concentrates also contain quantities of wheat, barley and peas in different percentages. Minerals are in a large amount. Also the fresh water during lactation is always available. During lactation the report of protein / fat is between 1.35 and 1.55.

H. Milk production.

According to the classical principles the milking is executed using normal milking technique, taking into account more or less the hygienic principles.

This is not found in the ecological practice, here is used modern harvesting equipment. Permanent milk yield is monitored and it increases with the development of goats. This yield is influenced by climatic conditions and thus grazing conditions, so if feed is based on lower water content and on a greater quantity of hay, the amount of milk is reduced. If the weather is favorable for grazing, the obtained quantity of milk is greater than the diet based on hay and in the case the fat and protein content increases significantly. [9]

Table 2. Quantity and quality of goat milk during the 3 years

Years	2008	2009	2010
Milk kg/ 30 goats	318.75	385.55	396.00
Milkyng days/goat	141.81	151.66	160.18

Table 3. Protein and fat content in function lactation and year

Lactation number	1.00	2.00	3.00
Protein, Kg	6.88	11.5	11.70
Fat, Kg	6.88	12.11	15.39

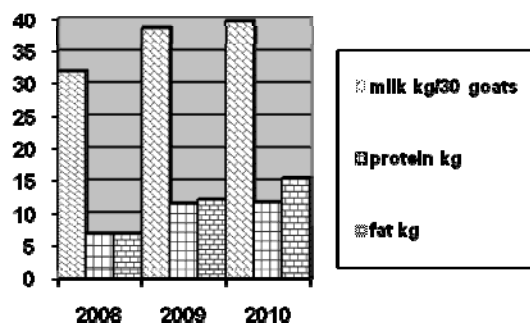


Figure 1. The quality and quantity of goat milk under 2008-2010

I. Health

Clinical mastitis in goats are common, they are more frequent in the milking season, particularly in the first two months of lactation.

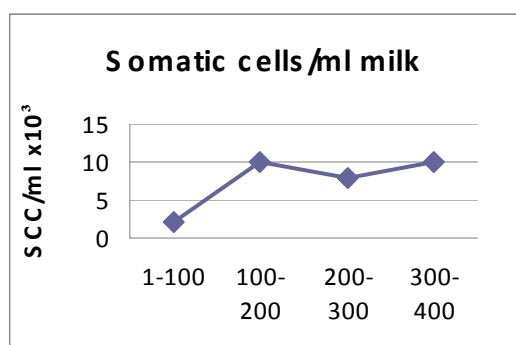


Figure 2. Number of somatic cells (SCC)/milk

Table 4. Number of somatic cells (SCC)/ml milk

Average content of SCC Cells/ml x 10 ³	The number of goat which contains that quantity of cells
1-100	2
100-200	10
200-300	8
300-400	10

J. Inspection and certification

Taking into account lately much more the quality of milk it is aimed to convert the classical methods into organic methods. Following the milk production, this conversion lasts about 24 months. After 12 months without forbidden treatments it is found that the pasture is perceived as being in conversion from fodder into raw material for fodders. Goats are considered to be converted after a period of six months, being under organic standards. Conversion is not always totally made. Conversion can only target a branch of the farm that can be managed under organic matter. This involves close attention to avoid contamination (banned disinfectants or fodder/ raw material for fodder are not found in 2092/91/EEC/Annex II–the regulations regarding the 2006 market are strict in terms of all permits forage such as: sugar beet, rape seed, seed sunflower and pumpkin seeds, potato protein, yeast and molasses (binder only) and a clear separation in terms of space.

4. Conclusions

Observing these conditions, it was found that an organic production can be achieved.

The milk can be sold as organic milk; there is only needed a period of 18 months of starting the conversion.

A growth requires greater management input in agriculture and also more labor intensive

manufacturing sectors. This is why organic products are more expensive than conventional foods.

The price of goat milk should be influenced by some of the seasonal differences: the transition period (March/April in September/October = 0.30€), summer (May/August +0.29 €), the winter (November/February + € 0.39).

Somatic cell counts varies from year to year and from season to season, and it may negatively or positively influence the price of organic milk in the sense that: a number less than 400,000 SCC/ml milk should supplement the price with € 0.12 / kg while the milk that contains more than 1.0 million SCC in summer and 1.4 million in winter is excluded from the market.

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