Tropical and Subtropical Agroecosystems, 11 (2009): 105-108

Tropical and Subtropical Agroecosystems

NOTA CORTA [SHORT NOTE]

GOAT MILK PRODUCTION UNDER ORGANIC FARMING STANDARDS

[PRODUCCIÓN DE LECHE DE CAPRINOS BAJO ESTÁNDARES DE GRANJAS ORGÁNICAS]

GEROLD RAHMANN

Institute of Organic Farming
German Federal Research Institute for Rural Development, Forestry and Fisheries
Trenthorst 32, D-23847 Westerau, gerold.rahmann@vti.bund.de

SUMMARY

Organic farming has emerged from its niche. This holds true for organic goat milk, yoghurt and cheese as well. Particularly in the EU many dairy goat farms have converted or want to convert towards organic farming to profit from the positive image and the good prices for milk (+100% in Western Europe and Alpine regions). High performance dairy goats demand excellent feedstuffs, a sound environment and top management. It was not clear how organic farming can fulfil these demands. The restrictive factors influencing the productivity of the animals in organic farming are as follows: limited concentrate feeding (<40% of ration), grazing systems with seasonal and annual changes in roughage qualities due to weather conditions and the prohibition of preventive and allopathic veterinary intervention. High performance dairy goat breeds like Alpine goats can produce about 600 to 800 kg milk with 40 to 50 kg fat and protein per 240-days under organic farming standards. The yield is limited due to roughage quality and management (health, breeding). With consideration of the high price (conventional: 0.38 €, organic: 0.70 € kg^{-1}) organic goat milk is a profitable product.

Key words: *Organic Farming, Dairy goats, milk performance*

INTRODUCTION

Standards for organic goat farming in the EU

Organic agriculture is considered an environmentally sound and socially acceptable land use system with "natural" food production (FAO, 2000). Organic farming is a food production label and is becoming more and more popular throughout the world (Organic Monitor 2008). In 2006, about 30.4 million hectares were certified according to organic standards and the world market volume was 38.6 billion US-$ (Willer et al., 2008). The EU and the USA are the biggest markets with an annual growth of 10 to 20%.

Principles and norms define the entire course of production, processing, packaging, transporting and marketing of organic products (IFOAM 2005, FAO/WHO 1999). The most important governmental organic farming standards are 2092/91/EEC (from January 1st, 2009: 834/2007/EC) of the EU, the NOP (USA) and JAS (Japan) (Schmid et al., 2007). They precisely lay down the production and manufacturing requirements for agricultural produce and foods labelled as organic products. All organic goods produced and sold must meet the national governmental standards set by these Regulations. The standards of organic agriculture cover conversion periods, stock densities, breeding, feedstuffs and feeding, standards in animal welfare, health and hygiene and inspection and certification (Rahmann, 2004).

Farmland-related animal husbandry

Livestock plays an important role on organic farms, e.g., in nutrient cycling. Landless animal husbandry is not organic and thus prohibited. The limited livestock density does not exceed 170 kg nitrogen ha^{-1} a^{-1} and is measured in livestock units (1 LU = 500 kg live weight). About 13.3 adult goats ha^{-1} a^{-1} are allowed (2092/91/EEC, Annex I B 7. and Annex VII).

Feedstuff and feeding

Organic goats have to be fed with 100% organic feedstuff. Ruminants have to be fed with a minimum of 60% of roughage (50% is allowed only in the first three months of high lactation). Organic feeds can be purchased from other organic farms. A maximum of 40% (purchased) and 60% DM (own production) of "in-conversion feedstuff" (after 12 months of conversion) is allowed. Permitted organic feedstuffs are listed (positive lists). Only single components, but not processed and mixed feeds, are considered in 2092/91/EEC Annex II.

A long discussion in the design of the regulation was the feeding of young stock. Kids have to be fed 45 days with "natural milk, preferably maternal milk." It is not established whether "natural milk" must originate from the same species; only that the

physiological needs have to be fulfilled. Organic cow milk is accepted for kid rearing.
In organic farming it is not permissible to use anything produced using GMOs (genetically modified organisms) or derivatives. This includes feed for livestock (conforming to definition of animal feeds in 471/82/EEC) and has been valid since September 24, 1999. Fermentation-supports for silage-making are allowed as long as they do not contribute to animal nutrition. Permissible minerals, vitamins and pro-vitamins for animal feed are listed in Annex II. Artificially produced vitamins are allowed in winter for ruminants. Only vitamins derived from raw materials occurring naturally in feedstuffs are allowed for herbivores (70/524/EEC).
It is not obligatory, but recommended, that ruminants should graze on pastures ("free-range") and not be fed in stables as long as the animal, weather and pasture conditions are suitable. Conventionally kept livestock from extensive grazing systems (950/97/EC) can graze on organic pastures as long as no organic livestock is present. For this grazing period, non-organic livestock must follow the rules of organic livestock keeping. This grazing has to be accepted and approved by the certification body.
Final indoor fattening of kids is possible if this period is less than one fifth of the animal's life, and a maximum of three months of the fattening animal's life. Every animal has the possibility of permanent access to feedstuff and water. That means that a minimum of one feeding place per goat has to be available.

Animal health and veterinary treatments

The guiding principle of animal health is to prevent disease rather than to cure or treat it. Robust, adapted and disease-tolerant livestock ensure fit and healthy animals. Local breeds are considered to fulfil these targets. Preventive treatments with "chemically-synthesised allopathic veterinary medicinal products" or antibiotics, as well as oestrus synchronisation, are forbidden. Vaccinations are allowed even when the vaccine is produced with the use of GMOs. Treatment of parasites and vaccinations are not considered as "chemically-synthesised allopathic veterinary medicinal products". De-worming can be done after a veterinarian has recommended that a heavy infection requires treatment. With such a recommendation the whole flock of small ruminants can be de-wormed. This is not possible under NOP.
If an animal is sick, a veterinary treatment is allowed (animal welfare). This has to be checked and carried out by a veterinarian. Natural methods of disease treatment are to be preferred as long as they help the animal. If these natural treatments do not help, chemical-synthesised allopathic treatments are allowed (even antibiotics). The withholding period is twice as long (minimum of 48 hours) as requested for the applied drugs. If an animal has been treated more than three times with chemical allopathic drugs, the products can not be sold under the "organic" label. Only one chemical allopathic treatment is allowed for livestock for which the production period is less than one year (kid meat). All health-related data have to be noted in a herd book and be presented at inspection.

Husbandry management practices, transport and slaughtering

The breeding of ruminants should be done by natural mating. Artificial insemination is allowed, but not embryo transfer, oestrus synchronisation, etc. Male breeding stock has to be kept on the farm, requiring extra farm resources (space, labour and feeds).
Animal cruelty of any kind is prohibited. Dehorning of goats is not allowed and may only be performed under special circumstances, regulated by the certification authorities (e.g., hygiene, animal welfare or bio-security aspects). Castration of male stock is allowed to maintain traditional animal husbandry practices. The castration should be done at a very young age (<1 month), or under anaesthesia by a veterinarian.
Ruminants have to be kept in groups to meet their social needs. How social needs can be fulfilled via farm conditions has not been defined. The transport of livestock is not clearly defined either. Stress-reduced loading, transporting and unloading of livestock without the use of allopathic tranquillisers, electrical shockers or similar tools is demanded.

Housing and stocking rates

If grazing is not possible, and goats have to be kept indoors, a permanently accessible open-air run is obligatory. Free moving stables with permanent access to open-air runs are organic standard for all livestock. Only with permanent summer pasture grazing is an outdoor run not necessary. The tethering of goats is prohibited. The minimum indoor space of an adult goat (net) is 1.5 m^2 and 0.35 m^2 for a kid. The out-door run should have a minimum of 2.5 m^2 for adult goats and 0.5 m^2 for kids (2092/91/EEC Annex VIII 1). A maximum of 50% of the stable surface can be slatted or grid floor, the rest has to be a flat and non-slippery surface. The boxes have to be strewed-in with organic materials (e.g., straw or wood chips; peat is difficult in terms of environmental issues).

Conversion, inspection and certification

Comparable to cash crop production, the conversion period for grassland for ruminants is 24 months. The conversion period starts after the last conventional utilisation. After 12 months without prohibited treatments, grassland is viewed as "in-conversion feedstuffs/feed materials". Livestock has a conversion period as well. After 6 months of being kept under

organic standards, goats are considered as converted (2092/91/EEC Annex I B 2.1.1. and 2.2.1.).
It is possible to convert just one branch of the farm to organic production, e.g., only the goat milk production. If there is a clear spatial separation (farm land, feed and dung storage as well as stables), the same animal species can be kept organically and conventionally by one farmer. This is very often done under NOP. A clear separation is needed to avoid contamination (e.g., prohibited disinfectants or feedstuffs/feed materials which are not in the 2092/91/EEC Annex II) and mixing of inputs (e.g., feeds and dung).
For example, goat milk can be sold under the label "organic" 18 months after the start of conversion: after 12 months 60% DM (dry matter) of own "in-conversion feedstuff" is available and 40% DM can be purchased (e.g., concentrates). After further six months with this feed, goats are converted and milk can be declared as "organic".
All organic farms, processor, trader and merchant are inspected annually by an independent certification body. Only if all standards and norms are fulfilled, the inspected products can be declared organic.

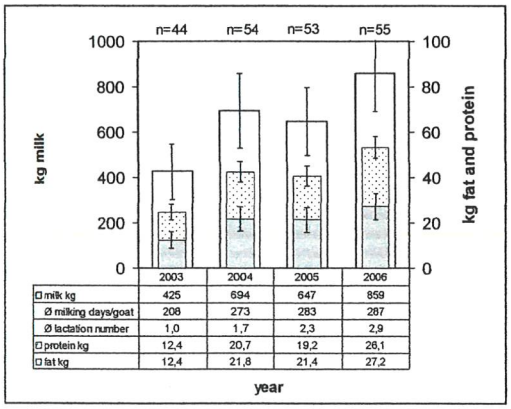
Organic goat milk production

Since 2003, at the experimental station of the German Federal Institute of Organic Farming about 70 dairy goats were kept to assess the production potential of high performance goats under the standards of organic farming. The goats were kept in modern stables, had seasonal access to pasture and got only farm produced feedstuff.
Organic goats receive high prices in Germany. The price structure for organic goat milk is different from price structure for cow milk. There are seasonal price differences (all per kg): transition period (Mar/Apr, Sep/Oct = +0.205 €), summer period (May-Aug = +0.19 €) and winter period (Nov-Feb = +0.29 €). Bonuses are paid for fat (+0.07 € per %) and protein (+0.085 € per %). A bonus is also paid for low somatic cell counts (SCC) (<0.6 million SCC = +0.01 €) and for long delivery contracts (5 years = +0.01 €). An average of +0.70 € / kg organic goat milk is paid (without VAT, free dairy plant). Reduction can happen for transport (-0.05--0.10 €/kg) and when bacteria and/or SCC are too high: bacteria (>100,000 germs/ml: 1st month = -0.02 €, 2nd month = -0.04 € and 3rd month = -0.06 € and so on). In summer months milk with more than 1 million SCC is punished with -0.01 € in the 1st month, -0.02 € in the 2nd month and -0.03 in the 3rd month. In winter the limit is 1.4 million SCC. More than 2 million SCC are generally punished with -0.02 € and every month -0.02 € more. Milk deliverance has to stop when SCC is 4 month above tolerance level. Detected inhibitors (antibiotics) and cow milk can be sued for damage.

Feeding. In Trenthorst about 30 ha grassland are available for roughage feeding. The ground covering is classified as Cynosurion cristati with 80 to 98% grass species. Dominating species are Poa trivialis (biomass-share of 3-30%), Alopecurus pratensis (2-30%), Festuca pratensis (1-5%) and Taraxacum officinale (0.1-15%). The goats go grazing from May to November. Surplus grass is used for hay production. In winter this hay was fed ad libitum. The quality of grass and hay was between 9 and 10 MJ ME with 140 – 150 g CP. The goats can select about 50% of the roughage is not used. The energy and protein quality of the roughage intake could not be measured. In relation to the milk yield, the goats got between 500 and 800 g concentrate per day via transponder feeding and partly while milking in the barn. About 180 kg of concentrate are used per lactation and goat (without dry season ration). The concentrate feed was made from wheat, oat and peas in different relations (between 12 and 13 MJ ME and 150 and 165 nXP). Minerals are fed ad libitum. Fresh water is always available. Throughout the lactation the fat-protein-relation was between 1.00 and 1.15.

Reproduction. The breeding has been naturally, with some exceptions artificial insemination for breeding buck production. First mating is done with 1.5 years and the lambing season is in February/March. The kid born number per goat is 1.98 to 2.24. The average herd age (without young stock) increased during the experiment from 3 to 4.9 years (1 – 2.9 lactation numbers).

Milk production. The milking was done with modern equipment and recording facilities. The lactation yield was measured by the milking equipment and verified by monthly milk control (B2-method: 240-days yield). The milk yield increased with the development of the herd. The annual differences in milk yield are due to weather and roughage qualities. 2005 was a wet summer, the goats did not like to graze and the hay quality was bad as well. In summer 2006 was excellent weather for goats. The milk, fat and protein yield increased significantly (Figure 1).



	2003	2004	2005	2006
milk kg	425	694	647	859
Ø milking days/goat	208	273	283	287
Ø lactation number	1,0	1,7	2,3	2,9
protein kg	12,4	20,7	19,2	26,1
fat kg	12,4	21,8	21,4	27,2

Figure 1. Lactation milk yield of organic goats 2003 – 2006

Health. Only some cases (2-6) of clinical mastitis occurred per milking season, particularly in the first two months of lactation. The somatic cell counts SCC have changed throughout the season and years (Figure 2). This does not necessarily refer to sub-clinical mastitis (Aulrich and Barth, 2008). Organic dairy factories pay extra for goat milk with less than 600,000 SCC (+0.01 €/kg) and punish milk with more than 1.0 million SCC in summer and 1.4 million SCC in winter (KTBL, 2008). Above 2.0 million SCC -0.02 €/kg are charged.

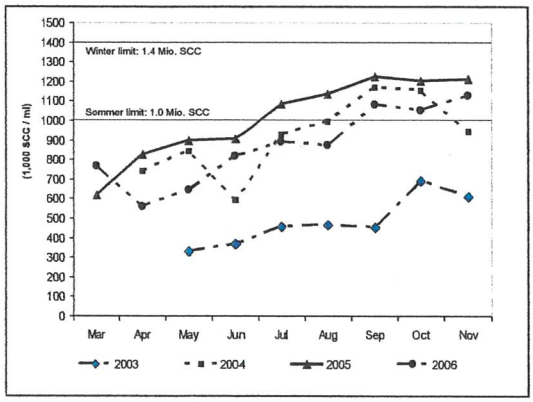


Figure 2. Seasonality of somatic cell count of the bulk milk 2003 - 2006

CONCLUSIONS

At the experimental station of the Institute of Organic Farming about 60 German Brown Alpine goats have been kept since 2003 to assess the milk production potential under the standards of organic farming. The goats are kept in modern stables, have seasonal access to pasture (May – November) and get only farm-produced feedstuffs. Under these conditions it has been shown that high productive organic dairy milk production is possible.

REFERENCES

Aulrich, K., Barth, K. 2008. Intramammary infections caused by coagulase-negative staphylococci and the effect on somatic cell counts in dairy goats. Agriculture and Forestry Research 1/2 2008 (58), in print [www.vti.bund.de].

EEC, 1991. Regulation (EEC) No. 2092/1991. Bruxelles, Belgium [can be found under http://eur-lex.europa.eu/en/index.htm]

FAO, 2007. International conference on Organic Agriculture and food security. Report of the conference held in May 2007 in Rome, OFS/2007/REP [www.fao.org/organicag/index.jsp]

FAO/WHO, 1999. Codex Alimentarius Commission Guidelines for the Production, Processing, Labelling and Marketing of organically produced foods. cac/gl, 32, Rome, Italy. [www.codexalimentarius.net/web/index_en.jsp]

IFOAM, 2005. IFOAM norms for Organic Production and Procession. Bonn. [www.ifoam.org]

KTBL, 2008. Milchziegenhaltung. Produktionsverfahren planen und kalkulieren. Darmstadt, Germany. pp 98 [www.ktbl.de]

Organic Monitor, 2008. [organic market information found under www.organicmonitor.com]

Rahmann, G., 2004. Ökologische Tierhaltung. Stuttgart pp 158

Schmid, O., Huber, B., Ziegler, K., Hansen, J., Plakolm, G. 2007. Analysis of differences between EU regulation 2092/91 related to other standards – Potentials for harmonisation, simplification and regionalisation. In: Zikeli et al. 2007. Zwischen Tradition und Globalisierung - 9. Wissenschaftstagung Ökologischer Landbau, Universität Hohenheim, Stuttgart, Deutschland, 20.-23.03.2007 [paper no 10023 in www.orgprint.org] [see as well www.organicrules.org]

Willer, H., Yussefi-Menzler, M., Sorensen, N. 2008. The World of Organic Agriculture - Statistics and Emerging Trends 2008. IFOAM, Bonn/Germany and FiBL, Frick/Switzerland. 272 pages [www.fibl.org/english/shop/index.php]

Submitted July 03, 2008 – Accepted May 25, 2009

ISSN 1870 – 0462

Tropical and Subtropical Agroecosystems

An international multidisciplinary journal

Special Issue
9th International Conference on Goat,
XXIII Conference of the Asociación Mexicana
de Producción Caprina

Guest editors
J.F.J. Torres Acosta, R. Cámara Sarmiento, A.J. Aguilar Caballero

Trop. Subtrop. Agroecosyst. Vol. 11 No. 1, 2009

Tropical and Subtropical Agroecosystems

Revista Publicada por el Campus de Ciencias Biológicas y Agropecuarias
Universidad Autónoma de Yucatán, México

Journal Published by the Biological and Agricultural Sciences Campus
Autonomous University of Yucatan, México

The journal is Abstracted / Listed in the following reference and database services

AgBiotech News and Information, Agroforestry Abstracts, Animal Breeding Abstracts, Dairy Science Abstracts, Field Crop Abstracts, Forest Product Abstracts, Grasslands and Forage Abstracts, Horticultural Science Abstracts, Indice de Revistas Mexicanas de Investigación Científica y Tecnológica (www.conacyt.mx/Indice/Indice_6.html), Irrigation and Drainage Abstracts, LATINDEX (www.latindex.unam.mx), Maize Abstracts, Nutrition Abstracts and Reviews Series B: Livestock Feeds and Feeding, PERIODICA (dgb.unam.mx/periodica.html), Pig News and Information, Plant Breeding Abstracts, Plant Genetic Resources Abstracts, Poultry Abstracts, Review of Agricultural Entomology, Review of Aromatic and Medicinal Plants, Review of Plant Pathology, Rice Abstracts, Seed Abstracts, Soils and Fertilizers, Soybean Abstracts, Tropical Diseases Bulletin, Ulrich's, Veterinary Bulletin, Weed Abstracts, World Agricultural and Rural Sociology Abstracts

Agricultural Economics Database (formerly AgECONCD), Animal Production Database (formerly BEASTCD), Crop Science Database (formerly E-CD), Directory of Open Access Journals (www.DOAJ.org), Forest Science Database (formerly TREECD and ForestScience.info), Horticultural Science Database (formerly HORTCD), Plant Genetics and Breeding Database (formerly PLANTGENECD), Plant Protection Database (formerly CABPESTCD), Redalyc (redalyc.uaemex.mx), Soil Science Database (formerly SOILCD), Veterinary Science Database (formerly VETCD)
Ag Biotech Net (www.agbiotechnet.com), Nutrition and Food Sciences Database (www.nutritionandfoodsciences.org), Animal Science Database (www.animalScience.com), DrylandScope (www.drylandscope.org), Forest Science Database (www.forestscience.info)

La revista se encuentra incluida en el
Indice de Revistas Mexicanas de Investigación Científica y Tecnológica - CONACyT-México
http://www.conacyt.mx/Indice/Index_Indice.html
http://www.conacyt.mx/Indice/Indice_6.html