Breeding dairy goats for organic farming – sustainable and animal-friendly

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Abstract

The proportion of organic farms in dairy goat farming in Bavaria and Baden-Württemberg is over 80%. As part of the GoOrganic project (2016-2022), the development of a breeding value estimation for lifetime performance as well as the establishment of targeted mating taking into account the natural mating as well as the establishment of a network of those involved in goat breeding, including advisory and further training structures, were addressed. Possibilities of breeding for health and robustness are being pursued in the current HealthyGoats project (2021-2024).

Keywords: dairy goats; breeding; lifetime effectiveness; longevity; health.
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Introduction

In Bavaria and Baden-Württemberg, over 80% of professional dairy goat farming takes place on organic farms (Manek *et al*., 2017). Professional dairy goat farming with populations of over 80 to 500 milked goats has increased significantly in recent years. Still, dairy goat farming is a small niche within agricultural production in Germany. Unfortunately, there are no exact figures available, only estimates but for example, there are approximately 50 farms with around 5.000 dairy goats in Baden-Württemberg (Kern, 2019). Goat breeding structures in Germany are significantly less developed than in other livestock species. Artificial insemination of goats plays a minor role here; there is only one EU-approved insemination station for small ruminants in Germany. Reproduction usually takes place seasonally and through natural mating. A few goat breeders import goat semen or live goat bucks from France or the Netherlands. The economic viability of dairy goat farms is primarily determined by milk production and, in particular, the milk ingredients. An increase in milk yield on organic farms is linked to good forage utilization, especially pasture or green fodder, as well as tolerance or resistance to parasites. This places new demands on the breeding goals of dairy goat breeding and corresponds to a high degree with the conceptual breeding goals of an organic breeding program. This was the initial situation for the GoOrganic project - development of a sustainable breeding program “Goats for organic farming”. The project was carried out from 2016 to 2022 by the University of Hohenheim together with various actors from science and practice in Bavaria, Baden-Württemberg and Thuringia. The goals of GoOrganic were to develop a breeding value estimation for lifetime performance as well as to establish targeted mating taking into account the

(prevailing) natural mating as well as to build a network of those involved in goat breeding, including advisory and further training structures.

Breeding value estimation for lifetime performance

GoOrganic was able to build on the breeding value estimation for milk production (Herold *et al*., 2018) and conformation traits (Lange *et al*., 2018) of the State Office for Geoinformation and Rural Development (Landesamt für Geoinformation und Landentwicklung Baden-Württemberg, LGL) for the two domestic breeds German Fawn and German White in Bavaria and Baden-Württemberg. Before the new breeding value could be developed, the influence of continuous milking on the lifetime performance of the goats had to be examined. Continuous milking is increasingly being practiced on agricultural dairy goat farms meaning that they have been milking part of their herd over several years, without any lambing in between. There are mainly three reasons for this:

1. The high workload during seasonal lambing;
2. The aim of producing milk all year round if possible;
3. The poor sales opportunities for goat kids that are not needed for breeding.

Wolber *et al*. (2018) and Wolber *et al*. (2019) proofed an influence of continuous milking on lifetime performance. Based on this, Wolber *et al*. (2021) estimated genetic parameters for various traits that describe an animal's lifetime performance. These are length of productive life (LPL), lifetime efficiency (LEF) and milk yield efficiency (EDM). From these traits, LEF as lifetime milk production (kg) per days of life appears to be particularly suitable for depicting an animal's lifetime performance. This means LEF combines the ability to achieve high levels of performance with the ability of a long and healthy life. According to Wolber *et al*. (2021) the heritability of LEF is 0.29 ± 0.03 and it is highly correlated with LPL (r_G = 0.65 ± 0.06). Additionally, a system for linear description of dairy goats was developed in 2013 and since 2018, breeding values for conformation traits are estimated (Lange *et al*., 2018). The information on conformation traits could also be included in a breeding value estimation for lifetime performance. A breeding value estimation for LPL based on a section model is currently being developed (Herold and Chagunda, 2023). The next step is to develop a breeding value estimation for LEF.

Breeding for health and robustness

As a performance test for health traits, a monitoring system for goats (GMON goat) was established in the goat herd manager (ZDV) of the performance testing organisations (LKV) in Bavaria and Baden-Württemberg. It is based on a central health key for dairy goats. The GMON goat is based solely on the observations of goat farmers and not on diagnoses by veterinarians. This is because there are only a few goat farms and the veterinarians usually only look after one or very few goat farms and therefore would not come up with the required number of diagnoses for data validation. Besides health data the farmers can also monitor measures such as vaccinations, deworming or hoof trimming. Even if the GMON goat is now well accepted, it must be taken into account that the number of farms that use ZDV is small. By the end of 2023, 716 observations from 11 farms had been entered in Baden-Württemberg and 6,471 observations from 49 farms in Bavaria. The GMON goat is important information for farmers when it comes to herd management or individual animal selection. The database is currently not sufficient to estimate breeding values. Additionally, Wolber *et al*. (2021) estimated genetic parameters for the indirect health traits fat:protein ratio (FPR) and urea content

(UC) which are recorded during the milk performance test. Heritabilities were 0.32 ± 0.03 and 0.47 ± 0.04.

In order to further advance breeding for health and robustness in goats, the HealthyGoats project started in 2021 - expanding breeding for health and robustness in dairy goats (www.gesundeziegen.de; Bernau *et al*., 2023). The HealthyGoats project deals with new health and robustness traits in dairy goats as well as advice on animal health and breeding. The detailed recording of possible new traits is carried out on ten farms. In addition, the GMON goat was expanded to another database, serv.it OVICAP, in order to expand data collection to other goat breeders and to carry out health trait monitoring throughout Germany. One project goal is to recommend new traits for breeding for health in goats and thus for performance testing.

Advice and further training

In addition to the development and establishment of new traits as well as the new performance testing systems, goat breeders and goat keepers should be actively involved in breeding. The method *Stable School* appears to be particularly suitable here. The project team of GoOrganic implemented the *Stable School* method as a breeding working group concept: A steady group of goat farmers meets regularly, moderated by a representative of the breeding association. A farm from the group is the host and determines the topic (an important / current challenge on the farm). The meetings always follow a strict schedule; at the end of the meeting, the farm has a portfolio of recommendations from the participants on how to overcome the operational challenge. The method was transferred to the HealthyGoats project, where the methodology was further developed in order to be able to offer online working groups. In the HealthyGoats project, the goat breeding associations of Bavaria, Baden-Württemberg and Thuringia also want to address the continuation of the method. In addition, the HealthyGoats project is working to establish the method of *breeding location decision* developed within the framework of GoOrganic in breeding advice and to train and coach interested consultants (Wolber *et al*., 2023).

Conclusion

Dairy goat farming in Bavaria and Baden-Württemberg is a small but growing niche. Predominantly organic goat farming is perceived positively by consumers. The work of the breeding value estimation team and the various goat breeding projects support goat farmers in Bavaria as well as in Baden-Württemberg and Thuringia. In Bavaria and Baden-Württemberg, goat farmers also benefit from performance testing organizations services in the areas of milk performance testing and LKV goat herd manager. This ensures that the goat farmers are well positioned for the future in the area of breeding and that progress in breeding in the sense of sustainable and animal-friendly breeding is possible.

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