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Topic 4 - Innovation in Organic farming: "thinking out of the Box"

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SOCIO-ECONOMIC IMPACTS OF ALTERNATIVE GIN CONTROL PRACTICES IN FRENCH ORGANIC DAIRY GOAT FARMS

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Abstract: This study aims at assessing the socio-economic impacts of alternative practices to control Gastro-Intestinal Nematodes (GIN) in French dairy goat farms based on a farm modelling and a participatory approach. The Structured-Decision-Making approach (SDM) was used to guide focus group discussions with farmers and technical advisers. We observed an increased gross margin of €41 per dairy goat when implementing the alternative GIN control practices, which was mainly due to a decrease in the milk withdrawal cost. The adoption of more targeted and strategic treatments was positively linked to the ease of implementation, the manager's experience, as well as alignment with core beliefs.

Introduction: Gastro-Intestinal Nematode (GIN) infections are a major health issue for small ruminants in outdoor systems because they induce considerable production and economic losses, and can affect health and welfare of sheep and goats (Taylor et al, 2015). The development of GIN resistance to chemical anthelmintic (AH) treatments makes the usual GIN control practices challenging (McKenna, 2010). Therefore, there is nowadays a need to develop alternative GIN control practices to avoid systematic AH treatments. Although the grazing system is less intensive in organic farming and can thus reduce the level of GIN infections, GIN infections also pose major problems in such systems (Cabaret *et al.*, 2002). One of the alternative is to improve the use of the AHs in small ruminant systems by restricting their use either by better defining the time of GIN risks for different herd sections (concept of Targeted Treatment (TT)) or by identifying individual animals that need to be treated for their own welfare and to prevent the diffusion of GIN to their congeners (concept of Targeted Selective Treatment (TST)) (Kenyon et al, 2012; Hoste et al, 2002).

This study aims to assess the economic impacts of alternative GIN practices for French organic dairy goat farms and to analyse their acceptance. The five alternatives studied are: (1) TT and TST (as previously defined), (2) strategic use of AHs, (3) non-access to pasture for young goats to reduce exposure to parasites, (4) changes in the pasture system (e.g. rotational grazing), and (5) use of bioactive plants in the ration.

Material and methods: The Structured-Decision-Making (SDM) approach (Fatorić and Seekamp, 2017) was utilised and adapted to assess the alternatives in a structured framework. This approach was combined with innovation theories, specifically the Rogers' theory and the theory of planned behaviour to highlight social issues.

Two focus groups were conducted with stakeholders in two French regions (Occitanie and Auvergne-Rhône-Alpes). A farm livestock model, with example data from a typical French organic dairy goat farm, was used to highlight the potential economic impacts of the five alternatives. This farm comprised a mean 65ha with permanent grassland and grazed forest as well as 120 dairy goats producing an average milk yield of 458 litres per goat annually. In terms of drenching, 3 doses of antiparasitic drugs (fenbendazole) were used annually for adult goats, first lactation goats and billies; with 1 dose for female kids of 8 to 12 months and growing kids (3-7 months).

The simple economic model included adjustable inputs and costs (e.g. AH and labour), as well as customisable milk (volume and price) and livestock growth output variables. The initial settings within the model were selected by experts in the project, but subject to review and approval by the farmers in each focus group. In total, eight different organic farmers attended the focus groups. Two local technical advisers, one moderator and one assistant were also involved in each focus group.

Each focus group was organised in five main steps, including: (1) definition of stakeholders' objectives, (2) transformation of objectives into evaluation criteria, (3) social assessment of alternative practices using a short questionnaire, (4) economic impact assessment through discussion and confirmation of the alternative practice assumptions based on the farm model results, (5) discussion of the trade-offs between objectives and alternative GIN control practices.

Results: The stakeholders made the observation that no clear evidence was available on the impact of the GIN control practice consisting of keeping young goats indoors; and also that there was no change in both the growth rate of the goats and their "resistance" level to GIN. As a result, there was no change in milk sales. The use of the alternative anthelmintic treatment with Eprinomectin and Levamisole, increased the GIN control cost by €135.21. Yet, the use of Sainfoin was assumed to increase the overall feed cost by 5% (€575 a year) in the model, mainly due to typically lower forage yield and possible higher rejection rates; and there was no stakeholders' disagreement nor clear counter evidence highlighted. In addition, an increase of 5% in the labour requirement was modelled for the alternative GIN control practices, mainly due to greater observation and management time with e.g. TT or TST approaches. The stakeholders considered this estimation was too high and the additional daily work was also adjusted to 30 minutes, corresponding to an annual extra labour cost of €2'063. Furthermore, due to regulatory changes, the milk withdrawal period had increased from 2 to 16 days for Fenbendazole. If Fenbendazole was currently used, the withdrawal period would prohibit the sale of the milk for 16 days, implying a cost (loss of revenue) of €8,215. The shorter withdrawal time with the use of Eprinomectin, implied only a milk withdrawal cost of €521.

Therefore, the implementation of the alternative GIN control practices increased the enterprise gross margin by €4'921 or €41 per goat annually. However, the net benefit was negative of €-2773 (€-23/goat) when the milk withdrawal change was excluded. Also, the increased labour cost only represented an opportunity cost since there was no paid employee on the typical farm.

In terms of the acceptance of alternative GIN control practices, the practice of keeping young female replacement goats indoors was faced with several limitations. It was seen as (1) less effective than the current practices, (2) not in line with the beliefs and values, (3) not easy to understand nor to adapt and implement. This practice was the least adopted one (43%). All the other practices had a higher rate of adoption (57% to 86%), and were easier to understand and adapt. They were also more in line with farmers' personal beliefs and norms. Farmers also highlighted that they already had extensive experiences on similar practices as TT, TST, and the strategic use of AHs.

Discussion: The adoption of TT, TST, and the strategic use of AH treatments was beneficial with a gain of €4'921 (€41/dairy goat). However, this was mainly due to a decrease of €7,694 in the milk withdrawal cost. There was only a negligible change in costs (+€135.21). That said, an annual saving of €790 was highlighted in the literature through a TT

approach in UK sheep (Kenyon and Jackson, 2012). The survey on social aspects has shown a positive relationship between, on the one hand, the easiness to use or implement and the experience on similar experiences and, on the other, the higher adoption of TT, TST and strategic use of AHs.

These findings imply a need to generate further knowledge on alternative GIN control practices that can be disseminated to farmers and advisors. Controlled research experiments to confirm the success of differing approaches is one possible way to deepen existing knowledge and make alternative practices easier and less risky to adopt at the farm level. A general conclusion from the focus groups is that the farmers are very aware of the problems of anthelmintic resistance and are keen to find solutions.

The stepwise approach based on SDM and innovation theories proved to work well, with the identification of farmers' objectives that helped them to reflect the influence of social aspects. A limitation was probably the length of the focus group with a loss of farmers' attention. The survey on social aspects was more time-consuming than expected and could have been merged with the general identification of barriers to adoption.

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