Alternate Grazing of Cattle and Horses reduces infections with Strongyle Parasites – a case study

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Gastro-Intestinal Nematodes (GIN) impact on the health and the production of horses and cattle, especially regarding young animals.[7,10] Mixed and alternate grazing of production animals (herbivores) for the prevention of GIN is an important element of pasture management with the potential benefit arising from the host-selectivity of numerous GIN species.[6,9,12] Small ruminants, for example, harbour a number of strongyle parasite species, which will not lead to stable populations in cattle, and in turn, cattle strongyles such as *Ostertagia ostertagi or Cooperia oncophora* will not reach patency when ingested by sheep. A substantial number of studies have been performed on mixed and alternate grazing between sheep and cattle or goats and cattle and have overall proven its benefit for different climates and environments.[1,3,8] Information on the effect of alternate or mixed grazing of cattle with equids is, however, scarce. This is surprising, as with the exception of liver flukes and the strongyle species *Trichostrongylus axei* and compared to the cattle/small ruminant grazing combination, horses share no GIN species with cattle. Only recently a French study by Forteau et. al. [5] has shown for the first time that mixed grazing of horses and cattle was beneficial for horses in terms of lower strongyle faecal egg counts. No information is, however, available as to whether the horse/cattle grazing combination is also advantageous in terms of reduced GIN infection in cattle.

Here we report on case of an alternate grazing example of horses and cattle to the benefit of young cattle in the Swiss Jura Mountains. The case study was conducted on a farm of 37 Red Holstein/Holstein cattle located at 1100 m above sea level that produces an average of 7 700 kg of milk yearly. Between 30 and 40% of the herd offspring is fattened or used for renewal every year. After weaning, first season animals (150 ± 40 kg) are grazed on a rotational scheme with three pastures (A, B, C) nearby the farm facilities with a stocking rate of between 3,9 and 10 livestock units (LU) per ha (mean: 5,2 LU/ha). On average, each of the three pastures is stocked 3 to 4 times per grazing season (approx. 6 months) without any supplementary feeding.

In 2018, the farm was enrolled in another project on strongyle propensity on cattle farms in western Switzerland and individual faecal egg counts (FEC) where performed according to Schmidt[11] for all young stock (n = 10) before the onset of grazing and every 6 weeks thereafter. The results of this monitoring revealed mean FEC of up to 1500 strongyle eggs per gram of faeces (EpG), depending on the sampling date. Animals needed to be treated with anthelmintics (0,5 mg/kg eprinomectin, Eprinex®; 7,5 mg/kg albendazole, Valbazen®) on two occasions during the 2018 season, and for albendazole (Valbazen®) a faecal egg count reduction test was performed according to the guidelines of the World Association for the Advancement of Veterinary Parasitology (WAAVP).[4] The results of the test confirmed efficacy (98% of FEC reduction) of albendazole.

The findings of the monitoring study were discussed with the farmer during winter 2018/2019 in order to optimize the grazing management of first season stock. The current management would have continued to implement an elevated risk for strongyle infection in forthcoming seasons without corrective measures. As options for additional or alternative pastures in the rotation were limited and because the farmer keeps/breeds horses, the decision was taken to integrate horses into the rotation of young stock, thereby assessing the potential preventive benefit of this practice with respect to strongyle infections of young cattle.

In 2019, young stock (n = 10) followed the rotation on the three pastures (A, B, C) as in previous years during two cycles (2 sequential stockings for each pasture) from mid-May to the end of July (i.e. 2,5 months). Individual FEC and a bulk qualitative coproculture (faeces of all animals) were performed at the end of July and revealed mean EpG of 100 and, based on L3-larvae identification, a strongyle population consisting of 15% *Ostertagia ostertagi*, 80% *Cooperia oncophora* and 5% other species. By the end of July Pasture A was spelled for four weeks (i.e. not used by grazing animals) and divided into two equal surfaces A1 and A2 with a double power fence.

Three horses (Franche-Montagne breed) were introduced on A1 and half of the young stock (n=5, random choice) previously having grazed pastures A, B and C was set on A2 for two weeks. Horse and young cattle stocking rates as well as the botanical composition of A1 and A2 were comparable (i. e. 4,7 LU/ha and *Poaceae/Fabaceae/*other=60/30/10% for both plots). The other half of young stock was transferred to pastures B and C during the two weeks of horses and young cattle grazing pasture A. From mid of August, pasture A was again spelled until the end of September (i. e. 6 weeks). In order to evaluate the benefit of horse grazing on subsequent strongyle infection of cattle, all young stock (n=10) were housed for five days in order to prevent presence of freshly ingested strongyle L3. Subsequently, the animals where treated with albendazole according to manufacturer's instructions 48 h before onset of grazing on pasture A. Treated animals were allocated to A1 and A2 according to their live weight (LW), in order to assure similar mean LW in both groups (i. e. 212 kg and 219 kg, respectively) and were allowed to graze on pasture A1 and A2 down to a herbage height of 5 cm (i. e. 6 days). All animals were then removed from pasture A and transferred to pastures which had never been used by ruminants before, in order to allow ingested strongyle L3 to reach patency. Twenty two days post-removal, all animals were weighed and individual FEC where performed using the mini-FLOTAC technique with a detection limit of 5 EpG.[2] Negative binomial regression analysis on FEC data revealed a trend for lower EpG in the alternate grazing group when compared to the control without horse grazing ($p=0.072$, $\alpha=0.05$, $\beta=0.434$). Although not significant (Student's t-test, $\alpha=0.05$), the alternate grazing group also had increased in live weight gain (figure 1).

In this on-farm case study, we were able to combine a number of real world elements such as a pasture rotation representing a high risk for strongyle infection, the resulting high strongyle burden in young cattle and the availability of horses. The study was, however, also subject to real world climatic conditions, which for the year 2019 were characterized by a very dry and hot summer season. This has led to very poor pasture growth, particularly in the second half of the season. The grazing period with strongyle naïve young stock (i. e. after grazing A1 with horses) was correspondingly short (i. e. 6 days) and resulted in infections of low intensities. Nevertheless, we were able to show a trend for lower EpG of cattle in the alternate grazing scheme. As the FECRT performed in 2018 showed a close to 100 % efficacy of albendazole, we are confident that EpG counted after patency of the strongyle larvae ingested during the 6 days tracer period in fact originated from those pastures and not from uncleared old infections. Even if our albendazole treatment might have been partially ineffective on inhibited *Ostertagia ostertagi* L4 larvae, there is no reason why these larvae would have unequally developed to patent adults within and between the 10 cattle. Overall, the results of this case study suggest that alternate grazing between cattle and horses can be used to the benefit of young cattle. The Jura Mountains, where animal production is very much directed towards these two species, are a region where the benefit of mixed and alternate horse/cattle grazing has an interesting potential in the control of strongyle parasitism. Further stu-

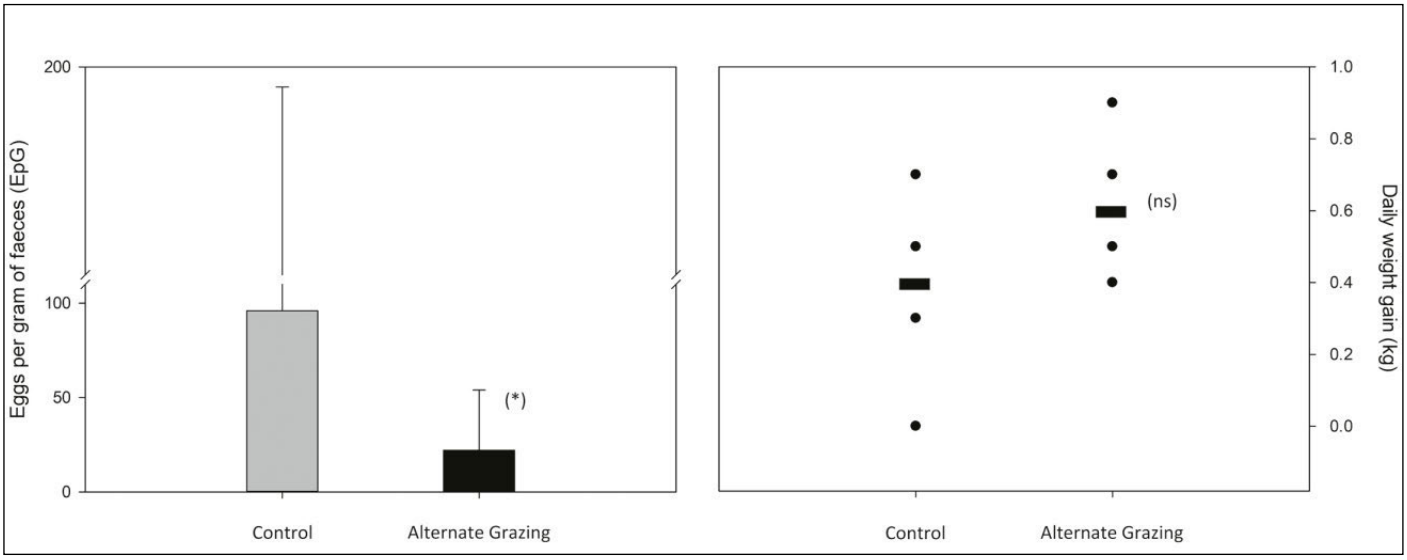

Figure 1: Mean strongyle eggs counts per gram of faeces (EpG) in young cattle (n=5 per group) grazing in alternance with horses or not (left panel) and daily weight gain distribution (solid circles) and mean weight gain (solid bars) of the two groups (right panel). Error bars represent the standard deviation. (*)=p<0.1, ns=not significant.

dies including a larger number of animals are needed before rational schemes of long term mixed and alternate grazing systems can be developed, which are adapted to the local conditions and which provide a preventive benefit for both, cattle and horses.

Statement

All manipulation and treatment of animals in the frame of this work were performed by the Veterinarian in charge of the farm. Since it is a retrospective, observational study of common practice in animal keeping in Switzerland, no permission for an experiment on animals was needed. The work was supported by the Sur-la-Croix Foundation, Basel, Switzerland.

Titles and Keywords

Key words: Alternate Grazing, Cattle, Horses, Infection, Prevention, Strongyle nematodes

Reduzierte Strongyliden Infektion durch alternierende Beweidung mit Rindern und Pferden – eine Fallstudie
Schlüsselwörter: Alternierende Beweidung, Rinder, Pferde, Infektion, Prophylaxe, Strongyliden, Nematoden

Réduction de l'infection par les strongles grâce au pâturage alterné avec les bovins et les chevaux – une étude de cas
Mots clés: pâturage en alternance, bovins, chevaux, infection, prophylaxie, strongles, nématodes

Il pascolo alternato nei bovini e nei cavalli permette di ridurre le infezioni da parassiti strongili – un esempio di studio
Parole chiave: Pascolo alternato, bovini, cavalli, infezione, prevenzione, nematodi strongili

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