PA-01

Assessment of body weight and weight gain of Eprinomectin or Doramectin injectable strategic control against gastrointestinal helminths on grazing Holstein heifers in Brazil

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Objective: The experiment was conducted to assess the expected body weight and weight gain of distinct strategic deworming control program with injectable eprinomectin or doramectin against gastrointestinal helminths on grazing Holstein heifers in central-west of Brazil from November 2018 until June 2019.

Material & Methods: On November 2018, 150 Holstein heifers with an average age of 5.8 months belonging to the commercial dairy farm located in Jatai (Southwest of Goiania state, Brazil) were enrolled and weighed in order to estimate the weight gain in the last 30 days prior the trial. Dewormer drenches or any other antiparasitic medicine had not been used on the heifers within the previous 120 days. Faecal samples were taken from all heifers before turnout and parasite egg counts ranged from 0 to 300 eggs per gram (EPG). The study population was then stratified with regard to the average daily gain and age, and animals were randomly allocated in 3 homogenous groups of 50 heads as follow, 1) Group 1 (G01) were injected with eprinomectin 2 % at a dose of 1 ml/100kg BW (NEOPRINIL® injectable - Virbac do Brasil), 2) Group 2 (G02) received doramectin 1 % at the dose of 1 ml/50kg BW (DECTOMAX® - Zoetis Brazil), and 3) Group 3 (G03) was designated as negative control group and was not treated with macrocyclic lactones, however, was injected with saline solution as placebo. Treatments were performed for all groups in November 2018 (age ± 5.8 months), February 2019 (age ± 8.8 months) and May 2019 (age ± 11.8 months), completing a study period of 210 days. All enlisted heifers were individually weighed on an electronic scale on day –30 (October 2018), d0 (day of the beginning of treatment), d30, 60 and every 30 days until d210. The weight gain of each animal was calculated considering the difference in bodies weights achieved over the study period.

Results: The average weight of monitored animals from G01 G02 and G03 on day 0 was 147.49 kg, 147.49 kg and 147.53 kg (n.s.), respectively. By d210, same groups showed an average weight of 268.9 kg, 264.6 kg and 258.5 kg, respectively. There was no statistical difference in the average weight obtained between the groups, over the study period. The average weight gain demonstrated by the heifers enlisted in G01, was statistically higher (P≤0.05) to the average weight gain showed by the control animals (G03) on d210. There was no statistically significant difference in average weight gain between the treated groups (G01 and G02) at the end of the observation period.

Conclusion: Dairy replacement heifers represents a drain of cash flow in any dairy farm. Support weight gain with an overall program including strategic deworming can increase the net value of heifers entering the herd. Results of this study confirm that a strategic deworming of grass-fed dairy heifers with injectable macrocyclic lactones improves live weight and weight gain.

Keywords: Eprinomectin, doramectin, helminths, Brazil.

PA-02

On the current resistance status of stable flies from dairy farms in Brandenburg (Germany)

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Objectives: Flies play an important role as pests and vectors of pathogens in ruminant production systems. During an earlier study, varying degrees of resistance against insecticides were demonstrated in 58 out of 60 *Musca domestica* field populations collected on dairy farms (Jandowsky et. al., 2010). A further pilot study was carried out to investigate the potential occurrence of resistance in stable flies (*Stomoxys* (*S.*) *calcitrans*) against commonly used adulticides and larvicides on dairy farms in the federal state of Brandenburg.

Material & Methods: Based on a questionnaire survey, 40 dairy farms were selected for an on-farm cross-sectional survey. An bioassay (FlyBox®) was concomitantly used to evaluate the field susceptibility of stable flies against the synthetic pyrethroid deltamethrin. To confirm the preliminary results observed in the on-farm bioassay, stable flies with strong evidence of deltamethrin resistance were collected from 10 selected dairy cattle farms for further investigations.

Using a susceptible reference strain of *S. calcitrans*, the discriminating dose (DD) of deltamethrin (2.3 ng/fly) and the organophosphate azamethiphos (4.9 ng/fly) were calculated. Subsequently, the progeny of the 10 stable fly populations was each tested with 1x, 4x, and 16x of the DD following recommendations of WHO (2016). Furthermore, two insect growth regulators (IGR), the larvicides cyromazine and pyriproxyfen, were evaluated at different concentrations based on the manufacturers' recommendations.

PASA-PCR (amplification of specific multiple alleles) were established with a forward primer matching all known alleles and reverse primers perfectly matching to the wild-type (Leu) or resistance-associated alleles currently known in pyrethroid resistant house and stable flies (e.g. kdr, kdr-his, super-kdr).

Results: The questionnaire survey revealed that pyrethroids are the most frequently used insecticides (78.9 %). The on-farm survey using the cardboard box bioassay (FlyBox®) indicated deltamethrin resistance in all of 40 strains tested (100 %). The topical application of deltamethrin at 1x,

4x, and 16x of the DD provided mean paralysis rates of 22.7 %, 55.3 %, and 87.9 % in the 10 suspect strains at 24 hrs. p. appl. At the highest dose applied (16x) 70 % of the stable fly populations showed paralysis rates < 98% indicating high resistance intensity according to the WHO concept (2016). The topical application of azamethiphos at 1x, 4x, and 16x of the DD revealed mean paralysis rates of 22.7 %, 55.3 %, and 87.9 % at 24 hrs. p. appl. Six out of ten populations (60 %) showed mortality rates below 98 % at the highest dose tested (16x) indicating high resistance intensity according to the WHO concept (2016). The use of the IGRs cyromazine and pyriproxyfen at the recommended concentrations resulted in an inhibition rate of 100 % in all 10 evaluated populations indicating full susceptibility against the two larvicides.

First results of the PASA revealed kdr and kdr-his mutations in *Stomoxys calcitrans* field populations being the second molecular confirmation of kdr resistant stable flies worldwide.

Conclusions: There is an urgent need for re-designing strategies to control fly populations, particularly with regard to any non-strategic use of adulticides. Before applying insecticides (biocides or veterinary medicinal products) it is highly recommended to assess the resistance status of flies in animal husbandries. Insecticides should only be used as the last resort of choice in a cascade of possible control measures such as improved manure management, insect traps and the use of biological control agents. Unfortunately, none of the aforementioned methods alone is sufficient to effectively control flies in dairy farms. Therefore, there is a considerable need for research.

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Keywords: Stomoxys calcitrans, insecticide resistance, kdr, cattle, Germany.

PA-03

Anti-O.ostertagi antibody ODR in bulk tank milk assesses exposure not parasitism

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Objective: International research has suggested that anti *O. ostertagi* antibody optical density ratio (ODR) of vat milk can indicate the level of milk production benefit producers will get from applying effective anthelmintic treatments to lactating dairy cows. ODR is an assessment of the magnitude of antibody production specific to *O. ostertagi*. In Australian pastoral dairy systems, lactating cows and young stock graze on pasture for 100% of their life and there will often be a prolonged worm season in dairy regions due to the high rainfall climate. The objective of this study was to look for a correlation between ODR and faecal egg count (FEC) or the presence of parasite eggs in faeces in corresponding cohorts.

Materials and Methods: Fourteen herds in south-west Victoria (Australia) were included in the study. All were commercial dairy enterprises. Milk vat samples were collected during the calving period for ODR. On the same day, faecal samples were collected from recently calved cows (less than 30 days in milk) for individual FEC (sensitive to 2.5 eggs per gram of faeces). Fifteen primiparous and 15 multiparous animals of representative ages were sampled. Farm practices including recent and routine anthelmintic use was recorded for each property and each cohort of animals. Data analysis was then undertaken using the Jamovi statistical package.

Results: Bulk milk ODR was not related to measurable FEC in corresponding herds. Bulk milk ODR was also not related to the proportion of animals in each corresponding cohort with detected parasite eggs in faeces. Bulk milk ODR was strongly correlated to the number of days since most recent anthelmintic application (r^2=0.73).

Conclusion: Anti-*O. ostertagi* ODR is a good measure of likely antibody presence against *O. ostertagi*. However, in pastoral systems in Australia where worms are present on pasture for sustained periods, possibly year-round, it may not be a good measure of current parasite load. ODR should not be used as the sole determinant of anthelmintic application in Victorian pastoral dairy herds.

Keywords: Australia, pasture-based, dairy, ODR, FEC.

PA-04

Prevalence and risk factors for hair loss in outdoor-wintered beef cattle during cold weather conditions

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Keeping cattle outdoor year-around is an attractive alternative for farmers due to low investment costs. Furthermore, keeping the animals outside can promote animal health and welfare compared to confined settings. In the Nordic countries, the climate can be a challenge though, as extreme cold and harsh wind can negatively affect an animal's thermal balance. The hair is an important parameter in the thermal retention capacity of an animal. Thus, if the hair thins out and bald spots appear, the welfare of the animal can get negatively affected along with the production value of the animal. Therefore, we conducted a repeated cross-sectional study to examine the epidemiology of hair loss in outdoor cattle in Sweden during the winters of 2019-2021. The three main objectives were (1) to describe the prevalence of hair loss in outdoor cattle, (2) to examine the development of hair loss in animals when there was no prophylactic ectoparasite treatment (delousing) ap-

plied, and (3) to investigate the associated factors for the hair loss outcome.

During January-February of 2019-2021, each group of outdoor cattle had an annual visit where they were inspected for hair loss, and group-level data, such as size, breed, and information on delousing treatment (date, drug), was collected along with the inspection parameters in the Swedish control program for outdoor cattle. A subset of the study population, among groups with no prophylactic delousing treatment, was followed up for investigating development of hair loss in animal level. Logistic regression was used to examine the association between collected animal- and group-level factors and status of hair loss with group and farm added as random effects when relevant. All the analyses were done using R.

A total of 463 groups from 75 farms were included in the study. The median size of the groups was 30 animals (range 2-698). 25.7% (n=119) of all the groups had at least one animal with hair loss. Prevalence of hair loss within group varied from 0.6% to 47.9% (mean 8.2%). Thirty-one farms had no hair loss observed. In the final model, group size ($p<0.01$) remained to be significantly associated with the hair loss outcome with the small groups (<14 animals) having lower odds. Also, having at least one dirty cow in the group significantly increased the odds for hair loss (OR=4.34, $p<0.01$), while delousing treatment significantly lowered the likelihood for hair loss in a group (OR=0.43, $p<0.05$). Among the groups with delousing treatment (n= 336), having at least one dirty animal in the group significantly increased the odds to have hair loss outcome (OR=12.64, $p<0.00001$), while delousing the animals before November significantly decreased the odds (OR=0.26, $p>0.05$). For the groups that did not have any prophylactic delousing treatment (n=127), only the big group size (>68 animals) was associated with the hair loss outcome (OR=3.64, $p<0.05$) in the final model.

A total of 3673 animals were included in the groups in which no prophylactic delousing was performed for the study. At the first visit, 249 animals showed hair loss (6.78%) while the proportion increased to 12.02% at the second visit and 18.22% on the third visit, suggesting spread of hair loss within the group over time. In the final model, being >2 years old (OR=11.89, $p<0.001$) and having bedding (OR=4.13, $p<0.001$) were significantly associated with higher likelihood of hair loss in an animal. Also in the final model, compared to Hereford, Angus had significantly higher odds to develop hair loss (OR=8.59, $p<0.05$).

In conclusion, the study showed a wide range of hair loss prevalence between farms and groups. Applying prophylactic delousing treatment significantly decreased the likelihood to develop hair loss in a group while increase in the proportion of animals with hair loss was observed among animals without delousing treatment in the follow-up visits. Along with the statements of veterinarians in the field, these findings suggest ectoparasites, i.e., lice, as a significant cause for the hair loss in these outdoor cattle. Yet, there were farms which had no cows with hair loss during all three years without any delousing treatment, indicating good farm management, like having no dirty cows, and keeping the group size more manageable can also be effective measures against hair loss.

Keywords: Range cattle, lice, ectoparasites.

PA-05

Effect of injectable eprinomectin on milk production and quality of dairy ewes reared semi-intensively and naturally infected with gastrointestinal nematodes

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Objective: The objective of this study was to investigate the effect of treatment with injectable eprinomectin on milk production and quality of dairy ewes grazing in communal pastures and naturally infected with gastrointestinal nematodes.

Material and methods: One-hundred and fifty (150) clinically healthy adult lactating ewes (2^{nd}-4^{th} month of lactation) from 3 flocks (50 animals per flock) were included. They were raised semi-intensively and had good body condition (BCS ≥2.5), good udder health and negative California Mastitis Test. On day -7, ewes of each flock were randomly allocated in 2 groups of 25 ewes: Control (group C) and Treated (group T). Groups were balanced for faecal egg count (FEC), milk yield record and Maedi-Visna seropositivity. On day 0, ewes in group T received a single subcutaneous injection of eprinomectin at a dose rate of 0.2 mg/kg BW (Eprecis® 20 mg/mL, CEVA santé animale). Ewes in group C were left untreated during the whole experiment. Ewes in group T with a FEC >300 eggs per g on day +60 were given a second injection with eprinomectin at the same dose rate. Faecal samples were individually collected on days -7, 0, +30, +60, +90, +120 for FEC estimations and coprocultures. On days -7, 0, +30, +60 and +90, individual milk yield (MY) was recorded using ICAR approved volumetric milk meters. Moreover, at the same test-days, individual milk samples were collected for chemical composition and somatic cells counts (SCC). Energy corrected milk yield (ECMY) for 6% fat was also calculated. Milk composition [fat (F%), protein (P%) and lactose (L%) content] was determined by infrared analysis (FTIR interferometer) using Milkoscan FT6000 (Foss Electric, Denmark) and SCC were evaluated by flow cytometry using Fossomatic FS (Foss Electric, Denmark). On each test-day, individual fat and protein yield (FY and PY, respectively) were calculated. Total lactation MY (TMY), total ECMY (TECMY), total FY (TFY) and total PY (TPY) were computed according to ICAR recommendations (ICAR, 2016). The effect of treatment on FEC (ln-transformed numeric FEC +1) and milk parameters (MY, ECMY, F%, P%, L%, FY, PY, and Log_SCC) were assessed with mixed models for repeated measures accounting for the random effect of each ewe and each farm. Last, the effect of treatment on TMY, TECMY, TFY and TPY was assessed with general linear models accounting for the random variation within each farm. All analyses were performed with IBM SPSS v.25 (Armonk, NY: IBM Corp.).

Results: The most prevalent parasite at pre-treatment and post-treatment days was *Haemonchus spp*. Treatment had a significant effect ($P<0.001$) on FEC reduction throughout the

trial; the overall efficacy on days +30 and +90 was 97.27% and 98.80%, respectively. In two out of the three farms, 80% and 91.3% of T ewes received a second treatment on day +60, due to high parasitic challenge and burden (FEC >300 eggs per g). Treatment had a significant effect (P=0.033) on MY. Estimated marginal means showed an average benefit of *ca.* 105 mL more milk per test-day for treated ewes compared to untreated ones. No significant effects of treatment were observed on the other parameters, although values were constantly numerically higher for treated ewes compared to control ones. T ewes produced 5.7% more milk (308.8 L vs. 292.1 L, P=0.158), 4.6% more fat-corrected (6%) milk (311.7 L vs. 298.1 L, P=0.236), 2.4% more fat (15.2 kg vs. 14.8 kg), P=0.557) and 6.4% more protein (11.8 kg vs. 11.1 kg, P=0.115) across the whole lactation compared to untreated ones.

Conclusion: In this field trial, injectable eprinomectin had a high overall efficacy against gastrointestinal nematodes, with *Haemonchus* spp. being the most prevalent species identified. Treatment had a beneficial effect on daily milk yield and potentially could lead to higher milk, fat and protein yield during a whole lactation.

Keywords: Eprinomectin, dairy sheep, milk yield, milk quality.

PA-06

Severe eosinophilic dermatitis in Jersey cows infested with *Leptotrombidium* spp (Acari: Trombiculidae)

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Objectives: In cattle, the lesions of eosinophilic dermatitis are attributed to different causes, but mainly to scabies and insect bites (stable flies, horn flies, tabanids, …). Harvest mites, also known as chigger mites, are rarely implicated and this work reports cases observed in Jersey cows. This study describes the clinical and histopathological lesions of several Jersey cows in an organic farming dairy herd in south-west France, that developed a severe outbreak of pruritic dermatitis mid-October suspected to be induced by Trombiculidae.

Material and methods: The herd consisted of 28 cows, including Jersey (21), Bretonne pie noir (3) and crossed Abondance-Montbéliarde (4) breeds. Lactating cows (17) had permanent grazing access except for indoor milking times since June. In addition, they received hay, concentrate and a vitamin/trace mineral supplement. Five 2-year-old and six 1-year-old heifers had been permanently kept in two different meadows, with no contact between them or with adults, since the beginning of the summer. Licking buckets of vitamin/trace mineral supplement were available. No antiparasitic treatment had been administered during the last five months.

Impression smears, multiple skin scrapes, swabs for bacterial culture and skin samples for histopathology were collected from the most affected individuals. Blood samples were taken and haematological parameters, activity of erythrocyte glutathione peroxidase (GSH-Px) and plasma concentrations of inorganic iodine, zinc, copper, vitamins A and E were determined. Jersey heifers were serologically examined for antibodies against *Besnoitia besnoiti*.

Results: Physical examination revealed no abnormalities other than dermatological. Pruritus was moderate to severe. Severe and extensive lesions of alopecia, lichenification and crusting were observed on the jaws, dewlap, face and distal limbs. Crusts overlying yellowish oozing material were present on the perineum and above the udder. Only Jersey cows were affected (10/13 lactating cows and 3/3 2-years-old heifers) with varying degrees of lesions severity. Lesions were more intense in 2-years-old Jersey heifers compared to the adults. The other group of heifers remained unaffected.

Differential diagnoses were parasitic skin disease (psoroptic or chorioptic mange, besnoitiosis, trombidiosis), zinc deficiency, superficial bacterial infection (staphylococcal pyoderma, dermatophilosis).

Cytologic examination of direct skin smears revealed very high numbers of eosinophils but no micro-organisms. Microscopic examination of skin scrapes showed numerous specimens of small-sized Trombiculidae larvae (150 µm x 250 µm) identified as *Leptotrombidium* spp and no other ectoparasite [1, 2]. Histopathological examination of skin biopsy specimens revealed severe hyperplastic, superficial and deep perivascular, and oedematous eosinophilic dermatitis. Bacterial culture yielded *Acinetobacter calcoaceticus* and *Pantoea agglomerans,* gram negative facultative anaerobic strains, considered as contaminants from the soil. Jersey heifers were seronegative for besnoitiosis. Complete blood counts revealed mild to moderate eosinophilia (0.6-1.3Λ10^9/L, reference interval 0.1-1.2Λ10^9/L). GSH-Px activity and plasma concentration of inorganic iodine, zinc, copper, vitamins A and E were in normal range. Final clinicopathological diagnosis was eosinophilic dermatitis likely due to Trombiculidae bites. No treatment was administered. Lesions had completely self-resolved by the end of December in the absence of any specific or concurrent treatment or major modification of the feeding or husbandry conditions. Further complete blood counts and skin scrapes revealed a 20 % reduction of eosinophils and no presence of parasite.

Conclusions: This case report emphasizes the need to include harvest mites in the differential diagnosis of bovine pruritic dermatoses. Around 3000 nominal species of Trombiculidae are known worldwide. Only a few have been identified on cattle [3]. To the best of the authors' knowledge, this is the first report of *Leptotrombidium* sp. in cattle in Europe. A concurrent contributing role of biting flies cannot be excluded. Finding lesions only in Jersey cows remained unexplained, but could be hypothetically consistent with individual genetic susceptibility to develop hypersensitivity reactions [4], or with numerous predisposing breed factors (feeding habits, skin characteristics…).

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Keywords: Jersey cows, eosinophilic, skin, Leptotrombidium, Trombiculidae.

PA-07

Efficacy of a targeted selective treatment in dairy herds affected by clinical dictyocaulosis

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Bovine dictyocaulosis is a pulmonary disease caused by the presence and development of the strongyle *Dictyocaulus viviparus* in the trachea and bronchi of cattle. This parasite is mostly observed in temperate countries, with potential important clinical and economical impacts. Individuals that already had contact with the parasite normally develop a strong acquired immunity. However, when the first contact with the parasite was poor and the contamination of the environment is high, clinical signs can occur. In such a context of clinical dictyocaulosis outbreak in dairy herds, current recommendations are to treat the whole herd with anthelmintic because of the presence of subclinical infestations. However, current guidelines against anthelminthic resistance recommend the use of selective treatment on adult cattle in order to maintain a refuge helminth population unexposed to anthelmintic. According to the heterogeneity of acquired immunity in a herd, and hence, of sensitivity of animals to parasitic infestation by *D. viviparus*, an early targeted selective treatment of clinically affected and main shedders animals may be effective to control the disease in the herd. Such a strategy was never tested for dictyocaulosis and a field validation is thus necessary to ensure a proper control of ditycocaulosis at the herd level.

Objectives: This study is a pilot study designed to assess the clinical relevance of a targeted selected treatment against *D.viviparus* at the beginning of a dictyocaulosis outbreak in dairy herds.

Materials and methods: In each herd with clinical signs of dictyocaulosis, we performed broncho-alveolar lavage on 6 cows and a pooled McKenna sedimentation on 10 cows of the herd to test for the presence of *D. viviparus*. We implemented a targeted selective treatment in three positive dairy herds by treating with injectable eprinomectine approximately 50% of the dairy cows including clinically affected, primiparous and postpartum cows.The follow-up was implemented one and three months after the targeted selected treatment by performing broncho-alveolar lavage and a pooled McKenna sedimentation. The farmers recorded clinical signs of dictyocaulosis at the herd level during the whole study period.

Results: In the three followed dairy herds, symptoms of dictyocaulosis vanished after the targeted selective treatment. After the treatment, we assessed a dictyocaulosis incidence rate of 2% by month during the whole follow-up, which indicates a low but persistent circulation of the parasite in the herd. Clinical signs of dictyocaulosis remained very low to inexistent in the three herds during the whole study period.

Conclusion: The targeted selective treatment implemented in the three herds of this study was efficient to control dictyocaulosis at the herd levels. To our knowledge, this study is the first to prove the potential interest of a targeted selective treatment to control dictyocaulosis at the herd level. These results should be confirmed in a larger study with more herds.

Keywords: Dictyocaulus viviparus - target selected treatment - dairy cattle - bronchoalveolar lavage - baermann sedimentation.

PA-08

Ctenocephalides felis (cat flea) infestation in neonatal dairy calves managed with deltamethrin pour-on in Australia.

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Objectives: Fleas are worldwide distributed hematophagous ectoparasites (Lawrence et al., 2019). The cat flea (*ctenocephalides felis*) is considered the most pervasive flea with veterinary significance principally centred around owned dogs and cats (Rust, 2017; Šlapeta et al., 2011). From the veterinary perspective, livestock are rarely recognised as cat flea hosts, or suffer from flea infestations (Araujo et al., 1998; Dryden et al., 1993; Kaal et al., 2006). Here we report on an outbreak of a flea infestation in neonatal dairy calves in eastern Australia.

Materials and Methods: The described events took place in April to June 2018 and included a group of calves (0–12 weeks) on a privately owned dairy farm in eastern New South Wales, Australia, under the care of the University Veterinary Teaching Hospital, Camden, Livestock Unit. The farm operates an all year round calving herd of 600 Holstein-Friesian cows and 400 youngstock.

All calves (n = 25) were individually restrained and their ear tag recorded for numerical identification. The body condition score (BCS) was assessed using the Penn State University method on a scale of 2–5, with 0.25 increments. A capillary refill time (CRT) was evaluated for each calf. Fleas were collected from the sternum and ventral inguinal area of the calves

using a metal flea comb (JW Gripsoft Flea Comb, Australia). Each calf was combed for 90 seconds in each area, 3 minutes per calf. The total flea count for both sites was reported. A commercially available deltamethrin pour-on formula (Arrest Easy-Dose, Virbac Animal Health, Australia) was used according to the registered label (1.9mg/kg). A Flea count was performed immediately before each treatment, and two weeks after the last treatment and the geometric mean calculated for the BCS and flea burden present. The flea reduction post treatment was calculated as a percentage difference between the pre-treatment and post-treatment geometric mean count. Statitical analysis was undertaken using the Mann-Whitney test and exact P values calculated using GraphPad Prism 7.02 (GraphPad Software, CA) with significance level considered at P-value<0.05.

Results: In early April 2018 examination of 15 affected calves (age 0–4 weeks) revealed a geometric mean burden of 41.51 (15–75) fleas (treatment group TA at timepoint 1 {TA1}). The affected calves showed dull and quiet demeanour, with the geometric mean BCS of 2.67 (2–4). At eight weeks (TA4), all calves showed bright, alert and responsive demeanour. The affected treated calves mean BCS was 4.04 (3.75–4.5) and mean count at TA4 was 2.29 (0–2) fleas on affected treated calves (n = 10), representing a 94.8 % reduction from TA1 count. In mid-April 2018, an examination of 10 calves (age<4 weeks) revealed a geometric mean burden of 9.32 (2–33) fleas (treatment group TB at timepoint 1 [TB1]). Demeanour of all calves was bright, alert and responsive. The geometric mean BCS was 3.79 (3–4.25). At four weeks (TB3), all 10 calves showed bright, alert and responsive demeanour. The calves mean BCS was 3.67 (3.25–4). The mean count at TB3 on the treated calves (n = 10) was 0.68 (0–4) fleas representing a 92.7 % reduction compared to TB1 counts.The initial flea burden between TA1 and TB1 (geometric mean) was reduced by 77.5 % in the youngest calf category with no clinical disease apparent and improved BCS from 2.67 to 3.79 in calves at TB1, 4 weeks post first application of pour-on deltamethrin. Both the flea count and BCS scores between TA1 and TB1 were significant (Mann-Whitney test, P-value<0.05).

Conclusion: Deltamethrin is a synthetic insecticide structurally based on natural pyrethrins (Mestres and Mestres, 1992) and causes rapid knockdown effect through paralysis of the insect nervous system. In cattle in Australia, deltamethrin is used for the treatment of lice and flies (Mestres and Mestres, 1992). We took advantage of the existing registered pour-on formulation for cattle, therefore assuring safety, and the knowledge that that the cat flea (*Ctenocephalides felis*), is susceptible to its active ingredient based on previous studies in dogs. The application of deltamethrin pour-on achieved the objective of improving the health and welfare of the calves, through a reduction in the number of fleas.

Keywords: Fleas, Neonatal, Calves, Deltamethrin.

PA-09

Gastrointestinal Parasites in Australian pastoral lactating dairy cows

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Objectives: In Australian pastoral dairy systems, a variety of 'routine' anthelmintic programs are used in lactating cows. These programs vary from no use of anthelmintics to administration of two doses to cattle annually. This suggests that there may be either some overuse potentiating the development of anthelmintic resistance, or underuse with consequential production inefficiencies. We aimed to identify the predominant gastrointestinal parasites in recently calved dairy cows in south-west Victoria, Australia. We also assessed the different anthelmintic management practices used on commercial, pasture-based dairy farms and their effect on measurable worm burdens.

Materials and Methods: The study included 18 commercial, pasture-based dairy farms in south-west Victoria, Australia. Faecal egg counts (FEC) were measured in recently calved cows (<30 days in milk). Fifteen primiparous and 15 multiparous animals were selected based on age (multiparous; 3-4 animals from each age up to 6 years of age) and calving date. Parasitism of individual animals was assessed through ultra-sensitive FEC, sensitive to 2.5 eggs per gram of faeces, in recently calved cows. These animals were sampled for individual FEC and pooled larval cultures (per group of 15 animals). Farm data such as recent anthelmintic use, management and cow body condition score (BCS) at sampling was recorded. Data analysis was undertaken using the Jamovi statistical package.

Results: Thirty-six per cent of all animals and 46% of primiparous cows had FEC of greater than 2.5 eggs per gram (epg). *Ostertagi ostertagi* was the most commonly identified gastrointestinal nematode in all age groups and on all farms. *Cooperia oncophora* were found to be the most frequent *Cooperia spp,* however *C. pectinate* or C. *punctata* were also present on some farms.

Multiparous cows in low BCS post calving are more likely to have a FEC of greater than 5 epg. Herds utilising anthelmintic routinely during lactation or at drying off did not have significantly different mean FEC or proportion of cows with individual FEC > 0 compared to those which did not utilise anthelmintics in lactating cows. Primiparous animals were more likely to have a reduced FEC post calving if the most recent anthelmintic was administered less than 50 days prior to calving.

Conclusion: Measuring the FEC at a sensitivity of 2.5 epg is an effective indicator that parasites are present in primiparous dairy cattle and may still be useful in assessing the presence of infection in multiparous animals if BCS is low. Whilst *O. ostertagi* is the most pathogenic and important gastrointestinal nematode in south-west Victoria, *Cooperia punctata* or C. *pectinata* are more prevalent than previously reported. In some herds these parasite species are still abundant in multiparous animals in moderate levels.

Anthelmintic use in Australian pasture-based systems during lactation or dry off is not likely to be effective at reducing the worm burden of cows in early lactation. Further investigation of timing and value of anthelmintic use in multiparous cattle is warranted.

Keywords: Dairy, roundworms, FEC, Australia, gastrointestinal parasites.

PA-10

Evaluation of the plasma profile and efficacy of eprinomectin 50 mg/mL prolonged-release injection administered at the base of the ear of cattle in Europe

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Objectives: To characterize the plasma profile and the therapeutic and preventive anthelmintic efficacy of eprinomectin 50 mg/mL prolonged-release injection (Eprinomectin-PRI) when administered at 1 mL/50 kg bodyweight (equivalent to 1 mg eprinomectin/kg) to cattle at the base of the ear in Europe.

Materials and methods: Data from one GLP study were used to characterize the plasma profile of Eprinomectin-PRI. In this study, blood was drawn from male and female Simmental cattle in intervals up to 136 days after Eprinomectin-PRI administration and the plasma was analyzed for eprinomectin levels using a HPLC method.

For the characterization of the efficacy, a total of 268 young cattle were included from four experimentally induced (96 animals) and one naturally acquired (16 animals) nematode infection studies (three controlled studies to confirm the therapeutic efficacy against developing and inhibited fourth-stage larval [L4] and adult nematodes; two controlled persistent efficacy studies) and one multicenter field efficacy study (four sites, 156 animals) which were compliant with VICH GCP and WAAVP and VICH anthelmintic evaluation guidelines. The studies included cattle of both sexes and several breeds (Brown Swiss, Hereford, Holstein, Montbéliarde, Pinzgauer, Simmental and various beef crosses) and were conducted in France, Germany and the UK.

In each therapeutic efficacy study, cattle were randomly assigned to groups and received either saline (controls) or Eprinomectin-PRI (treated) when the parasites were developing L4, inhibited L4 and/or or adult nematodes. In the two persistent efficacy studies, cattle were randomly assigned to controls (saline-treated) or two Eprinomectin-PRI-treated groups and were challenged daily with a combination of infective larvae of parasitic nematodes from 80 to 100 or 100 to 120 days after treatment. Percent efficacy was calculated based on the comparison of geometric mean nematode counts of the Eprinomectin-PRI-treated vs. control animals established following necropsy.

In the field study, animals were randomized in a 1:3 ratio to serve as saline-treated control or to be administered Eprinomectin-PRI. Animals were weighed and fecal samples collected at intervals starting pre-treatment through 120 days after treatment for fecal egg and lungworm larval counts. At each site, six sentinel animals grazing in intervals with the study animals were necropsied to characterize the nematode challenge of the study animals.

Results: As expected based on the release characteristics from the Eprinomectin-PRI polymer-based formulation, the eprinomectin plasma profile is characterized by an initial release peak (observed one to five days post administration) declining into a 'trough' region which is followed by a second peak around 80 to 100 days post administration and a subsequent rapid decline. Mean eprinomectin plasma concentrations of >1 ng/mL were observed up to 126 days after Eprinomectin-PRI administration. The basic pharmacokinetic parameters (C_{max}, T_{max}, AUC) were comparable for male and female cattle (P>0.05).

The therapeutic efficacy studies demonstrated Eprinomectin-PRI is efficacious (>90%, P<0.05) against developing L4 *Bunostomum phlebotomum*, *Cooperia oncophora/surnabada*, *C. punctata*, *Dictyocaulus viviparus*, *Haemonchus contortus*, *Nematodirus helvetianus*, *Oesophagostomum radiatum*, *Ostertagia ostertagi/lyrata*, *Trichostrongylus axei* and *T. colubriformis*; against inhibited L4 *Ostertagia* spp., *Cooperia* spp. and *Nematodirus* spp.; and against adult *B. phlebotomum*, *Chabertia ovina*, *Cooperia curticei*, *C. oncophora/surnabada*, *C. punctata*, *D. viviparus*, *H. contortus*, *Nematodirus battus*, *N. helvetianus*, *O. radiatum*, *Oesophagostomum venulosum*, *O. ostertagi/lyrata*, *O. leptospicularis*, *T. axei*, *T. colubriformis* and *Trichuris discolor*.

The persistent efficacy studies demonstrated Eprinomectin-PRI prevents the establishment (>90%, P<0.05) of *B. phlebotomum*, *D. viviparus*, *H. contortus*, *O. ostertagi/lyrata* and *T. colubriformis* for minimum 120 days, and of *C. oncophora/surnabada*, *C. punctata* and *O. radiatum* for minimum 100 days.

Examination of the sentinel animals for characterization of the parasite challenge in the field study identified 18 species of gastrointestinal nematodes, *D. viviparus* lungworms, and *Moniezia* spp. cestodes. At all post-treatment sampling intervals, Eprinomectin-PRI-treated cattle had significantly (P<0.0001) lower strongylid egg and *Dictyocaulus* larval counts than the controls with 98.8% and 100% reduction, respectively, after 120 days of grazing and Eprinomectin-PRI-treated cattle gained significantly (P<0.05) more weight than the controls.

Conclusions: Results of the studies consistently demonstrated that Eprinomectin-PRI can provide high levels of control of all important nematode parasites of cattle including prevention of infection for up to four months following a single administration. The unique biphasic plasma profile supports the efficacy demonstrated in the controlled and field efficacy studies.

Keywords: Eprinomectin prolonged-release injection, cattle, efficacy, parasitic nematodes, plasma profile.

PA-11

Productivity impacts of low to moderate faecal egg counts in growing cattle: Implications from meta-regression of faecal egg count and average daily weight gain

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Objectives: Quantify the productivity impacts of low to moderate faecal egg counts (FEC) in growing cattle using the results of a meta-analysis and meta-regression of the association between FEC and average daily weight gain (ADG).

Material and Methods: To quantify the association between strongyle parasite burden and productivity, results were used from a meta-analysis and meta-regression of the relationship between differences in FEC and ADG (Shephard *et al*., under review). In this process, papers from all continents were included, and 27 publications containing 86 groups and 59 comparison ratios were analysed. This analysis identified a 0.127 linear reduction in average daily weight gain ratio for every $\log_{10}$ increase in the difference between comparison and reference group faecal egg count. For example, compared with an animal with FEC of 1 egg/g, an animal with FEC of 10 eggs/g would have 12.7% lower ADG.

This association was then incorporated into a deterministic model, with several input scenarios of starting FEC over two specified growing period durations (Table 1). Average daily weight gains were determined based on the starting FEC, compared with a referent FEC of 1 egg/g, and then extrapolated out for the specified growing period. The starting bodyweight for cattle in all scenarios was set at 100kg.

Results:

Table 1. Two scenarios of defined growing period, and defined target weight, at various starting FEC.

Growing Period 120 days			
Starting FEC (eggs/g)	ADG (kg/day)	Final Weight (kg)	Difference in Final Weight (kg) Compared with FEC of 1 eggs/g
1	1.25	250	-
10	1.09	228.5	-21.5
40	0.99	216.9	-33.1
80	0.94	211.4	-38.6
Target Weight 250kg			
Starting FEC (eggs/g)	ADG (kg/day)	Days to Reach Target Weight (d)	Difference in Days to Reach Target Weight Compared with FEC of 1 egg/g
1	1.25	120	-
10	1.09	139	+19
40	0.99	152	+32
80	0.94	160	+40

Conclusion: These results demonstrate the impact of low to moderate FEC in growing cattle, thereby highlighting the impact of the emerging problem of anthelmintic resistance in cattle and demonstrating the importance of integrated parasite management.

Shephard, RW, Hancock, AS, Playford, M, and Oswin S. A systematic review and meta-analysis of impact of strongyle parasitism on growth rates in young cattle. Under review.

Keywords: faecal egg count, gastrointestinal parasitism, productivity, average daily gain, anthelmintic resistance.

PA-13

Attempts to achieve apparent (in the field) nematocidal efficacy while using popular anthelmintics with varying degrees of anthelmintic effectiveness

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Objectives: The studies reported herein were conducted to further assess the effectiveness of routinely-applied anthelmintic treatment and then attempt to achieve efficacious treatment via means not normally used but which should be put in place if the debilitating effects of nematode parasitism are to be addressed. For more than a decade, it has been well recognized that there has been the lack of a commercially-available, single active, broad spectrum, efficacious anthelmintic for use in ruminants. Producers and veterinarians who have recognized this shortfall, have attempted to achieve effective nematode control in a variety of husbandry (pasture management, dietary inclusions, grazing management, etc.) and treatment (frequency, dose level, targeting, combinations, etc.) schemes. Anthelmintic combinations, formulated as such, represent a logical means of biding our time until a new, efficacious compound becomes available. Said combinations have not become available in the USA, where it is now common that combinations be actuated “animal side”; with the effectiveness of some of these treatment practices evaluated in the studies reported here.

Materials and Methods: In three recent field studies, we looked at apparent anthelmintic efficacies via the fecal egg count reduction test (FECRT) in naturally-infected replacement and stocker cattle; assessing various single and combined anthelmintics. In all instances, at least ten animals were placed in each treatment group, with fecal egg counts recorded for all animals on the days of treatment and again 14 days later. Coprocultures were conducted on all individual fecal samples with egg counts > 20 eggs per gram (EPG).

Results: In the first field study (utilizing beef steers), injectable ivermectin and oral fenbendazole were evaluated at 1X and 2X prescribed dose rates, and as a combination of both at 1X. Neither treatment with ivermectin as the sole anthelmintic resulted in a FECR rate of > 47%. All treatment regimens wherein fenbendazole was used resulted in FECR rates > 99%. In the second field study (utilizing replacement heifers),

1X dose rates of moxidectin injectable, moxidectin topical, ivermectin injectable, doramectin injectable and eprinomectin long-range were evaluated. During the 14-day post-treatment period, fecal egg counts actually rose for ivermectin treated cattle (42%) and for doramectin treated cattle (9%). Treatment with moxidectin topical, moxidectin injectable and eprinomectin long range decreased egg counts by 6, 26 and 56%, respectively. As a follow-up to the second field study and utilizing cattle from the same herd, oxfendazole and levamisole drenches, given separately at labeled dose rate, were evaluated. Both treatments resulted in FECR rates > 98%. For the cattle used in the 3 field studies, *Cooperia punctata* and *C. oncophora* accounted for > 90% of the coproculture larvae harvested on a treatment group basis at both pre- and post-treatment.

Conclusions: It is generally accepted that FECR rates > 90% are necessary in order for an anthelmintic to be assumed to be effective. Given the results obtained herein, it is apparent that the avermectins (ivermectin, doramectin, eprinomectin) are not effective at normal or double dose rates, and that moxidectin is not efficacious at 1X. Fenbendazole, oxfendazole (benzimidazoles) and levamisole (an imidazothiazole) administrations are still proving to be efficacious (> 90% FECR); a guarded assessment of true nematocidal effectiveness given the potential disparity between egg count and worm count reductions. Combinations of a macrocyclic lactone (ML) with a benzimidazole or imidazothiazole also result in acceptable FECR percentages, most likely due to the non-ML in the combination. The implications of these findings, coupled with the findings of many others, are that macrocyclic lactone use in cattle should be augmented with combination. Clearly, gastrointestinal nematodiasis is not being effectively abated with ML use; use that results in: (1), prolonging the deleterious effects of subclinical infections, (2) perpetuation of the selection and propagation of ML-resistant parasites, and (3), continued economic losses (wasted monies spent on non-efficacious products and continued poor animal health and productivity). At the present time, we are clearly past the time of routine "ML remedy" for nematodiasis in herbivores. The looming query at hand is what we do presently to preserve animal health.

Keywords: Cattle Nematodes, Effective Anthelmintics.

PA-14

Evaluation of four protocols for *Haematobia irritans* control and their impact on the productivity of grazing calves on tropical farms in Veracruz

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Objectives: The objective of the study was to compare different chemical control protocols on horn fly infestation (*Haematobia irritans*) and their impact on grazing calves weight gain (*Bos taurus x Bos indicus)* in humid tropical farms of Veracruz, México.

Materials and methods: The study was conducted for 90 days and was carried out 4 farms located in the north-central region of Veracruz, México with a humid warm tropical climate. A total 100 calves (*Bos taurus x Bos indicus* cross) on four farms were included in the study. Farm 1 (T1): 40 calves (mean weight ± SD 174 kg ± 12.0 kg) were poured- on with Flumethrin (Bayer) 0.5% plus Ciflutrina 0.5% (1.0 ml/10 kg of weight) on the back when the average fly infestation exceded 200 flies/animal; Farm 2: 32 calves (mean weight ± SD 109 kg ± 20 kg) were sprayed with 22.47% Cypermethrin (Bayer) spray (1.0 ml of 22.4 % formulation diluted with 1 litre of water) when the average fly numbers infestation exceded 200 flies per animal. Farm 3: 14 calves (mean weight ± SD 126 kg ± 35 kg were tagged with Diazinon (40%) impregnated eartags and were given mineral salt mixed with oral Tetrachlorvinfos larvicide (Bayer) at doses of 780.0 mg/animal/day from the start of trial and pour on application of Flumethrin 0.5% plus Cyflutrin 0.5% (1.0 ml/10 kg weight) on the back of the animal when average fly infestation was greater than 200 flies/animal; Farm 4: 14 calves (mean weight ± SD 134 kg ± 16 kg were given 25.0 g of mineral salt (Bayer) mixed with an oral Tetrachlorvinfos larvicide (97.3%) at a dose of 780.0 mg/animal/day from the start of trial. The animals were weighed and fly counting were done at the beginning and every 15 days until the end of the study. The initial weights (IW), final (FW) and daily weight gains (DWG) of calves and fly infestation (FI) were analyzed using an ANOVA for completely random designs and the means were compared with the Tukey test.

Results: The IW of T1 T2, T3 and T4 were 174.0±12.0, 109.0±20.0, 126.0±35.0 and 134 kg ±16.0 respectively, with no statistical differences between them (P> 0.05). The FW in T1 was 159.7±18 kg with a weight loss each animal in 90 days of 14.3±8.0 kg (P<0.05), coinciding with the high level of *Haematobia irritans* infestation, while the FW in T2, T3 and T4 the calves had a weight 140.0±40 kg, 160.0±25 kg, 165.0±30 kg respectively (P> 0.05). The infestation of flies in each calf for T1, T2, T3 and T4 was 211, 135, 57, 113 respectively, T3 was statistically different from the other treatments (P<0.05). Daily weight gains (DWG) were affected by the level of fly infestation being the highest in T3 with 446.0 g/day/animal (P<0.05) while in T2 and T4 it was 368.0 and 346.0 g/day. In T1 the average weight loss/animal during (90 days) was 14.3 kg ± 9.0 % equivalent to $ 32.5 dollars/calf.

Conclusion: The most effective protocol for the control of *Haematobia irritans* was T3, where a combination of eartags, application of adulticide solution and oral use of a larvicide resulted in higer weight. From return on investment point (ROI) of view protocol (T3) offers a higher economic returns for farmers in the tropics.

Keywords: Horn fly, Haematobia irritans, calves, grazing, weight gains.

PA-15

Seroprevalence and risk factors associated with *Toxoplasma gondii* in breeding ewes from western Mexico

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The objective of the study was to determine the seroprevalence and risk factors associated with *Toxoplasma gondii* in breeding sheep from western Mexico. 184 blood samples were collected in six municipalities of the state of Jalisco, Mexico. Sampling was performed by venipuncture of the jugular vein using tubes without anticoagulant. To obtain serum, blood samples were centrifuged at 3,000 revolutions per minute for five minutes. Serum was placed in 1.5 mL polystyrene tubes and stored at -20°C until use. Diagnosis was made using the commercial ELISA kit [IDEXX Toxotest Ab Test, IDEXX Laboratories, Inc., Westbrook, Maine], with 100% specificity and 98.9% sensitivity. The manufacturer's recommendations were followed, diluting the sera 1:400; the plates were read at an optical density of 450 nanometers and a cut-off point of > 0.30. Determination of positive and negative cases was performed using xChekPlus software [IDEXX Laboratories, Inc., Westbrook, Maine]. During the visit to the farms, a survey was applied with the objective of identifying possible risk factors, through a logistic regression analysis, calculation of Odds Ratio (OR) and Confidence Intervals (CI). The OR values were estimated using the independent variables that showed statistical significance in the multivariate analysis ($p < 0.05$). The analysis was carried out using the Statistics and Data Science (STATA) v. 10.1 software. An overall seroprevalence of 61.96% (114/184; 95% CI 62.09 – 61.81) was identified. The identified risk factors were: Poor hygiene conditions (OR 12.5; 95% CI 3.4 - 45.1 P<0.05), Presence of cats (OR 9.5; 95% CI 1.9 - 45.7 P<0.05), Presence of others domestic animals (OR 5.7; 95% CI 1.5 – 21.3 P<0.05), Urban context of the farm (OR 9.5; 95% CI 2.5 – 35.4 P<0.05) Public water supply (OR 5.3; 95% CI 1.0 – 26.1 P<0.05). In conclusion, *T. gondii* is an important parasite in sheep farms in western Mexico, identifying a high seroprevalence that may be associated with reproductive losses. The risk factors identified in this study may be useful to veterinarians in the region, farmers, and health personnel to reduce exposure to this parasite and the damage it causes to public and animal health.

Keywords: Parasite, Protozoan, Serology, Sheep Farm, Mexico.

PA-16

Eimeriosis age dynamics in Italian dairy cattle farms

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Objectives: Coccidiosis, or Eimeriosis, is a common clinical or subclinical cause of poor performance, illness, and economic loss in dairy calves (Drackley J., 2008). The prevalence of *Eimeria* infection in cattle is generally high (Daugschies A. et al., 2005). As the epidemiology of *Eimeria* is different from farm to farm due to specific calves raising conditions, proper coccidiosis' control requires an understanding of the life cycle and transmission dynamics (Keeton S. et al., 2018). The aim of this analysis is to describe Eimeriosis' age dynamics in Italian dairy cattle farms by summarizing the results of a coprological diagnostic service (Elancox) developed by Elanco Animal Health together with IZSUM laboratories.

Material and Methods: In this data analysis only dairy cattle farms with *Eimeria* confirmed presence have been included. Individual fecal samples were collected directly from the animal.

Samples were grouped into pools and then processed using FLOTAC® double technique (Cringoli G. et al. 2010) with sucrose and potassium iodomercurate (Rinaldi) solution. For *Eimeria* identification, feces were mixed with 2.5% potassium bichromate solution and placed in a Roux bottle for 2 weeks, at 25 °C, away from light. After incubation, samples with more than 250 *Eimeria* oocyst per gram of feces (OPG) were examined at light microscope 400X and identified using morphological criteria described in literature.

Additional epidemiological data have been collected: number of animals on farm, mean age at weaning, mean calves' age for every pool.

Results: From January to December 2021, 110 farm samples (395 pools), belonging to 105 farms mainly located in Northern Italy, have been analyzed. Herd size averaged 586±558 animals; this variable was further divided in classes for the data analysis: <400 animals (46%; n=50), between 400 and 800 animals (31%; n=34) and >800 animals (23%; n=25).

Each farm sample was composed by 1 to 6 pools. Species identification was possible in 68% (n=75) of the farm samples. According to a previous study by these authors (Guadagnini M. et al., 2021), *Eimeria* oocysts counts above 400 OPG were considered as high: 77% (n=85) of the samples had at least one pool with high oocyst count and 45% had 2 or more high count pools. Overall, 10 species were identified with an *E. zuerni* prevalence of 88% (n=66), *E. bovis* 67%(n=50), *E. alabamensis* 15% (n=11), *E. cylindrica* 44% (n=33), *E. ellypsoidalis* 69% (n=52), *E. auburnensis* 39% (n=29), *E. subspherica* 16% (n=12), *E. wyomingensis* 9%(n=7), *E. pellita* 3%(n=2), *E. brasilensis* 3%(n=2).

In 96% (n=72) of the samples at least one pathogenic species was found (*E. zuerni*, *E. bovis*, *E. alabamensis*). Age at sampling varied between 20 and 350 days, with an average of 107±54 days.

Mean age at first detection of a high OPG count was 85±43 days, with 16% of the farm samples having a high OPG only pre-weaning, 34% only post-weaning and 22% both pre- and post-weaning. Herds with more than 800 animals had higher proportion of samples with at least 1 pool with high OPG (<400 animals= 68%; 400-800 animals= 79%; >800 animals=92%;

p=0.04) and a different distribution of high counts over time (p=0.009) with more pre and post-weaning high counts compared to smaller herds (<400 animals=14%; 400-800 animals=24%; >800 animals=36%) and less pre-weaning only high counts (<400 animals=12%; 400-800 animals=27%; >800 animals=8%). Mean age at weaning was not correlated with the risk of detecting high OPG, and no age pattern was detected for any single Eimeria species. A positive correlation was detected between age at weaning and the risk of detecting high OPG pre-weaning(p=0.02).

Conclusion: Very little knowledge is described in literature regarding Eimeriosis age dynamics, as this aspect seem to be farm specific and highly correlated with housing and management practices. Data presented in this work show that there is wide age range for Eimeriosis, and pathogenic species detection is frequent. No *Eimeria* species pattern by age has been recognized, but rather relevant differences have been described among farm size, with bigger farms having high chance to show high OPG counts and for a longer period. In summary, data confirm the key role of an accurate sampling and diagnostics protocol, to determine farm specific *Eimeria* dynamics and build a control strategy.

Keywords: Eimeriosis, Age, Italy, Cattle.

PA-17

Effect of *Haemonchus contortus* on feed conversion rate, average daily gain and carcass characteristics of Limousine-cross calves

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Objectives: The objective of the study was to evaluate the potential effects of *Haemonchus contortus* infection on: (a) average daily gain and feed conversion ratio of Limousin-cross male calves and (b) carcass yield and carcass quality at slaughter.

Materials and Methods: The study was conducted for 200 days (April to October 2020) in an intensive-management fattening farm with Limousin-cross male calves in Central Greece. The animals (average age: 8.13 months), which had been naturally infected, were allocated, based on age matching, in two equal (n=12) groups, with animals that underwent anthelmintic treatment (T group) and remained as untreated controls (C group). Standard parasitological examinations were performed throughout the study to monitor the gastrointestinal parasitic burden of all animals at weekly intervals. Five days after group allocation, animals in group T were administered ivermectin (dose rate: 200 μg per kg bodyweight) subcutaneously. Bodyweight of animals was measured at the start and the end of the study. Consumption of feed (concentrate and roughage) by animals of the two groups was calculated daily. At slaughter, carcasses were weighed and assessed by means of the standard EU scale for the classification of carcasses of bovines for conformation class and fat cover class. Statistical analysis was performed to compare results of parasitological examinations, of bodyweight gain and feed conversion ratio and of carcass characteristics.

Results: There were no differences in mean epg counts between the two groups at the start of the study: 545 for T and 550 for C group (p=0.87), with 98% and 97% of larvae in coprocultures identified as *Haemonchus contortus*. After treatment, mean epg counts from T group were 0 until the end of the study, whilst those from C group were >540 epg with ≥97% of larvae in coprocultures identified as *Haemonchus* spp. throughout the study. Animals in T group had a higher bodyweight gain and a better feed conversion ratio than animals in C group: 355.5 kg and 3.85 versus 254.5 and 6.07, respectively (p<0.0001 for all comparisons). Moreover, animals in T group yielded on average heavier carcasses and of better quality that carcasses yielded by animals in C group: 350.5 kg of median U class (very good) with slight fat cover (2) versus 254.5 kg of median R class (good) with average fat cover (3), respectively (p<0.01 for all comparisons).

Conclusions: The study evaluated the effects of *Haemonchus* infection on the production and carcass characteristics of fattening calves in a long-term assessment. The results indicated that *Haemonchus*-infected animals had adverse lower production characteristics (bodyweight gain and feed conversion ratio) of calves and yield lighter carcasses of inferior quality than parasite-free animals.

Keywords: Haemonchus contortus, feed conversion rate, average daily gain, carcass, Limousine breed.