Sheep & Beef Research Review™

Making Education Easy

Issue 3 – 2015

In this issue:

Welcome to the third issue of Sheep and Beef Research Review.

The main theme running through this issue is parasites, both internal and external, including anthelmintic treatments and the management of anthelmintic resistance, and parasiticide resistance in ectoparasites. Also featured are articles on feed deprivation to facilitate livestock transportation for slaughter, foetal loss and foetal resorption in sheep, an unusual cause of abortion in sheep, and a guide to post-mortem examinations.

We hope that these state-of-the-science selections inform and benefit your practice and we look forward to receiving your comments and feedback.

Kind regards

Andrew Roe

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Recent developments in the management of anthelmintic resistance in small ruminants – an Australasian perspective

Authors: Sutherland IA

Summary: This review article summarises recent advances in the theory and practice of managing anthelmintic resistance in sheep in Australasia. The topics covered include identification and mitigation of high-risk practices, using effective anthelmintics, and maintaining a refuge of unselected parasites. Evidence continues to favour the use of combination products to maximise efficacy and delay the onset of treatment-failure and that anthelmintic resistance can be controlled, and in many cases reduced in severity, with improved adoption of properly designed and implemented resistance management programmes.

Comment: With the arrival in recent years of two novel anthelmintic classes as well as the publication recently of several New Zealand studies on the benefits and risks of some common parasite control strategies, this article is a timely review of drench resistance management in this part of the world. The author, veterinary parasitologist Ian Sutherland, bases the review around the three principles of resistance management, namely:

- Identification and mitigation of high-risk practices.
- Use of effective anthelmintics.
- Maintenance of refugia.

The first section is concerned solely with one risk factor, specifically the use of controlled-release capsules and long-acting injectable products. While this may disappoint readers seeking a more comprehensive review, I guess the approach is understandable given that there have been studies published this year on this very topic and the fact that the paper is titled "Recent developments . . ." The following two sections offer a good balance of current recommendations, the background and justification for these recommendations, and the challenges facing both vets and farmers in following them. If you are like me and feel that you have a sound grasp of the theory of worm management on sheep farms but sometimes struggle to convince your clients to take your advice on board, then the closing chapter will give you some encouragement. Entitled "Adoption and Implementation of Recommendations", the author describes a project whereby close adherence to best practice guidelines leads to some demonstrable beneficial results for the participating farmers.

Reference: N Z Vet J. 2015;63(4):183–7

Abstract

Production benefits from pre- and post-lambing anthelmintic treatment of ewes on commercial farms in the southern North Island of New Zealand

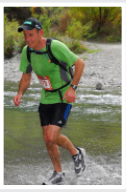
Author: Miller CM et al.

Summary: The aim of this study was to measure production responses to anthelmintic treatments administered to adult ewes around lambing. Ewes carrying twin lambs, from farms (eight in year 1 and six in year 2) in the Wairarapa region were enrolled in 14 trials (part of an experiment carried out on one farm in one year). In experiment 1, ewes treated 2-4 weeks pre-lambing with a controlled-release capsule (CRC) containing abamectin, albendazole, selenium and cobalt, were compared with ewes injected pre-lambing with a long-acting selenium plus vitamin B12 product, and to untreated ewes. Experiment 2 included the same treatments, plus a CRC administered at pregnancy scanning. Experiment 3 also included the same treatments as experiment 1, plus administration of a CRC containing albendazole, selenium and cobalt, injectable moxidectin or oral derquantel plus abamectin, all of which were administered pre-lambing, or oral derquantel plus abamectin administered 4-6 weeks after lambing. According to the results, ewes that received a CRC pre-lambing were heavier than untreated ewes (mean 3.2kg) at weaning in 12/14 trials, and pre-mating (mean 2.8kg) in 9/14 trials ($p<0.001$). Compared with mineral-treated ewes the mean difference was 2.8kg pre-lambing (9/14 trials) and 1.7kg pre-weaning (6/14 trials). Lambs reared by treated ewes were heavier (mean 1.5kg) at weaning in 6/14 trials ($p<0.001$) but there was no significant effect of CRC treatment on total weight of lambs weaned per ewe. Variation in weight of lamb weaned per ewe was explained by differences in lamb survival from birth to weaning ($p<0.001$).

Comment: It has long been recognised that sustainable worm management on our sheep farms is a balancing act between maximising productivity and minimising the risk of anthelmintic resistance. This study carried out by AgResearch Grasslands scientists and Baker and Associates consultant Chris Garland, delves into the very heart of this concept. By quantifying various productivity responses to the use of CRCs and long-acting injectable products (an accepted risk factor in the development of drench resistance), the study endeavoured to determine the magnitude and variability of any benefits to their use. The take-home message from the study, that there is a lot of variation between farms and between years when it comes to the responses shown to long-acting pre-lambing anthelminitics, provides an opportunity for vets to engage more with their sheep farmer clients when it comes to selecting appropriate worm management strategies. I disagree with the final comment in the abstract, which infers that most vets perceive that anthelmintic treatment of ewes around lambing is always beneficial. My observation is that most vets are well aware of the risks of such treatment and now urge their clients to confine such practices to those seasons and/or those animals where a benefit is most likely to be achieved. This study supports such an approach and, if nothing else, will hopefully highlight to farmers that this is a complex issue with benefits not guaranteed, and therefore may stimulate more dialogue between themselves and their vets.

Reference: N Z Vet J. 2015;63(4):211–9
Abstract

Independent commentary by Andrew Roe.



Andrew has worked in a Southland mixed practice for over 25 years. With sheep, beef and deer being the predominant farming types when he moved to the region, he has considerable experience in these areas and, even though dairy cattle work now takes up a large part of this time, he is fortunate enough to still have a reasonable number of sheep clients in his practice area.

Being a founding director and former shareholder of VetSouth he has experience in practice management and governance, as well as being involved in the industry at a national level where he is currently a member of the executive of the sheep and beef cattle special interest branch of the NZ Veterinary Association, is on the panel of NZVA's Red Meat Veterinary Strategy Group as well as representing the interests of sheep, beef and deer vets on NZVA's Standards Committee.

A cost-benefit analysis of pre- and post-lambing anthelmintic treatments to twin-bearing ewes on commercial farms in the southern North Island of New Zealand

Authors: Garland CB & Leathwick DM

Summary: This cost-benefit analysis of the administration of anthelmintics in adult ewes around lambing used production data from comparisons of different anthelmintic treatments with no treatment obtained from 14 trials conducted on farms in the Wairarapa region (*see previous paper*). The costs (2013 New Zealand dollars) were: the purchase price of products and the labour cost of administration. The key benefits were: increased value of ewes sold (culled) at weaning, additional lambs weaned related to ewe live-weight at mating, increased total weight of lamb weaned per ewe, and reduced number of ewes requiring removal of soiled wool at weaning due to a lower dag score. The economic return on treating ewes around lambing with anthelmintics was highly variable and across all trials treatment resulted in a financial loss in 18/38 (47%) groups of ewes. The mean net benefit from pre-lambing administration of a controlled release capsule (CRC) containing albendazole and abamectin was $5.36 (95% CI: 2.64-13.35) per ewe, but overall was not significantly different from zero. A breakdown of the overall gross benefit showed that weight of lamb weaned per ewe had the largest influence (mean benefit of $5.68 per ewe), followed by ewe live-weight pre-mating ($2.45 per ewe), ewe live-weight at weaning ($0.66 per ewe) and reduced dag score ($0.15 per ewe). There was no significant difference between any of the treatments except a short-acting oral treatment at tail-docking had a lower net benefit than a CRC containing albendazole administered pre-lambing ($p<0.05$).

Comment: This paper is the second one generated from the project referred to in the previous abstract. The authors have assigned values to the productivity responses reported following anthelmintic treatment to ewes around lambing, enabling the calculation of the cost benefit to such treatments. Given the variability in production responses observed it is not surprising that there is also wide variation in the cost benefit between farms. The cost benefit to a mineralised dual-acting CRC given pre-lambing, for example, ranged from a very impressive $42/ewe down to a low of –$15/ewe. The mean benefit was a little over $5/ewe, although this proved to be statistically insignificant thanks to the level of variability seen. In such studies, however, I am not sure that reporting a mean value is particularly helpful, possibly sending the wrong message. The main message, of course, is that the outcome, whether expressed in terms of animal responses or cost benefit, is widely variable and benefits, while often achieved, are by no means guaranteed. As is mentioned in the paper, further studies aimed at explaining the variation would be very helpful. Monitoring such things as worm burdens post lambing, spring pasture covers and maybe even parasite burdens in lambs during the previous autumn (and hence predicted pasture larval contamination) would be worthwhile. Certainly these are some of the factors that many vets currently consider when advising their clients on the use of pre-lambing anthelminitcs.

Reference: N Z Vet J. 2015;63(4):220–6
Abstract

The effects of depriving feed to facilitate transport and slaughter in sheep – a case study of cull ewes held off pasture for different periods

Authors: Fisher MH et al.

Summary: The aim of this study was to determine the ability of sheep to mobilise their body reserves after being deprived of feed prior to transport for slaughter. A total of 240 3- and 4-year-old cull ewes were held off pasture for 0, 9, 18, or 30 hours (n=60 per group), then transported 1 hour by road, unloaded and washed, held in lairage for 3 hours, and then slaughtered. Blood samples were collected to determine concentrations of serum metabolites indicative of adaptation to fasting, and attributes of carcass quality were also measured. At slaughter, increased time off pasture prior to transport resulted in no change in serum glucose levels. There were differences ($p<0.001$) between the group fasted for 30 versus 0 hours in mean free fatty acids [0.98 (SD 0.32) vs 0.58 (SD 0.23) mmol/L], β-hydroxybutyrate [0.69 (SD 0.17) vs 0.42 (SD 0.11) mmol/L], triglycerides [0.29 (range 0.13-0.83) vs 0.22 (range 0.06-0.96) mmol/L], and urea [10.17 (SD 1.80) vs 6.94 (SD 2.03) mmol/L] levels. Different periods of feed deprivation had no significant effect on carcass weights (mean 22.7; range 13.2-32.9kg) or dressing out percentages (mean 40.9; range 27-49%). Meat ultimate pH was unaffected by the period of feed deprivation but meat became darker ($p<0.05$) and had reduced redness ($p<0.001$) with increasing time off feed.

Comment: Transport of sheep and cattle is another area where compromise is often needed. Obviously from an animal welfare point of view the less time an animal is off feed the better. But to minimise carcass contamination at slaughter, as well as stock effluent spillage during transport, farmers are required to withhold feed prior to transport. According to the National Stock Effluent Working Group's publication, "Industry Code of Practice for the Minimisation of Stock Effluent Spillage from Trucks on Roads", ruminants should be taken off feed at least 4 hours, and not more than 12 hours, before transport. These guidelines are supported in the recently revised NAWAC document, "Transport within New Zealand Code of Welfare".

When this period of feed deprivation is added to that which occurs during the trip itself, as well as the period after transport (e.g. at the slaughter premises) our livestock are often kept off food for periods well in excess of 24 hours. This study looked at the consequences of this in ewes, by monitoring various serum metabolites and ultimate meat pH after varying lengths of pre-transport feed deprivation ranging from 0 to 30 hours. While those ewes held off feed the longest had higher levels of metabolites such as free fatty acids and β-hydroxybutyrate, the level of serum glucose was not affected suggesting that, even at 30 hours feed deprivation, the animals' adaptive mechanisms were coping well. Similarly there was no correlation between time off feed and ultimate meat pH, carcass weight or carcass dressing out percentage.

Reference: N Z Vet J. 2015;63(5):260–4
Abstract

Fetal loss in maiden ewes – an update

Authors: Ridler A

Summary: This article provides an update on what is currently known about foetal loss in maiden ewes, including outcomes of a recent survey and on-farm investigation. According to the author, foetal loss in maiden ewes (ewe hoggets or two-tooth ewes) is characterised by mid-gestation pregnancy loss without obvious expulsion of aborted materials. On-farm this is detected by either the presence of non-viable foetuses identified *in utero* during ultrasonographic pregnancy diagnosis or when ewes are confirmed pregnant at an initial pregnancy diagnosis but at a subsequent pregnancy diagnosis are found to be non-pregnant.

Reference: Proceedings of the Society of Sheep and Beef Cattle Veterinarians of the New Zealand Veterinary Association, Proceedings of the Society of Sheep and Beef Veterinarians of the NZVA and Cervetec Conference 309, pp 169–174, Jan 2015
Abstract

Fetal resorption in hoggets – results of an investigation in 2014

Authors: Hilson R et al.

Summary: Hogget mating and lambing has become a mainstream production option in New Zealand and outbreaks of intrauterine foetal death occur regularly each year. The causes and epidemiology of the syndrome are poorly understood and it is a particularly vexing and costly problem that only seems to be manifested in hoggets. This paper describes several outbreaks of significant hogget abortion in Central Hawkes Bay area (CHB) ewe flocks in recent years and the investigation of hogget intrauterine foetal death syndrome undertaken in CHB by Vet Services (HB) Ltd.

Reference: Proceedings of the Society of Sheep and Beef Cattle Veterinarians of the New Zealand Veterinary Association, Proceedings of the Society of Sheep and Beef Veterinarians of the NZVA and Cervetec Conference 309, pp 175–180
Abstract

Comment: Over the last couple of decades hogget lambing has become an integral part of many New Zealand sheep farming operations. Accordingly, most farmers who have established a routine vaccination programme against toxo and campy now begin the programme in their hoggets rather than their two-tooths, if their hoggets are mated. Despite taking such precautions varying levels of foetal loss in hoggets is frequently reported, with some farms experiencing the problem repeatedly. The disorder is detected either at scanning when a number of non-viable pregnancies are seen, or at lambing when a proportion of those animals earlier scanned as pregnant fail to produce a lamb. The previous two papers give valuable updates on this vexing problem that I am sure has frustrated most sheep practitioners (as well as some of their clients!) up and down the country.

The first paper is by Massey University veterinarian, Anne Ridler, who has been at the forefront of investigations into the disorder. Anne outlines the findings of the initial farmer survey, which Massey researchers designed in an attempt to get a handle on the extent of the problem (looking at maiden ewes in general whether they be hoggets or two-tooths) and she then summarises the findings of investigations carried out so far. As infectious causes were not identified in many of the flocks examined, attention was turned to nutritional and/or physiological explanations of the problem. In the final section of the paper Anne, after briefly describing what future studies are planned, gives a very helpful set of guidelines for practitioners seeking to investigate cases on their own clients' properties. In the second paper Hawkes Bay vet Richard Hilson et al. describe a local approach to the issue of foetal resorption in hoggets. As other practitioners will have experienced, the cost of such investigations deter many farmers from proceeding especially as:

1. History shows that the chances of a definitive diagnosis are low.
2. Many feel that even if a diagnosis was reached it would not be of practical help as most affected farmers already protect their hoggets against those conditions for which a vaccine is available.
3. Previous experience has shown that affected animals usually get back in lamb the following year and do not suffer recurrent abortion episodes.

To overcome these financial concerns, funding was secured to fully investigate five cases in Richard's practice area during the 2014 scanning season. The paper goes on to not only describe the investigation protocol itself, but also the costs involved, which is handy information for any of us who have clients contemplating investigating a problem. Two detailed case studies follow and readers will be heartened by the fact that one of these cases bucked the trend and a definite cause of the problem was identified.

Southland sheep abortions – a novel agent investigated

Authors: Rawdon T et al.

Summary: Several abortion outbreaks with similar liver lesions, and with no evidence for the involvement of common agents, have been seen in sheep flocks in Canterbury, Otago and Southland since the early 1990s. Initial investigations into the potential aetiological agent were largely unrewarding. In 2009, a Southland veterinarian reported an abortion storm affecting a large commercial flock of approximately 4,000 ewes. Aborted lambs had enlarged livers, some with pale foci resembling those seen in *Campylobacter* spp. abortions; however, no *Campylobacter* spp. were isolated. Laboratory testing excluded toxoplasma infection, the exotic agents Q-fever and *Chlamydophila abortus*, and *Salmonella* or *Brucella* spp. An aetiological agent was pursued leading to the identification of the bacterium *Flexispira rappini* (subsequently *Helicobacter* spp. with flexispira morphology). This organism had been reported as a cause of sporadic ovine abortions in the US and UK. A provisional diagnosis of abortion associated with *Helicobacter* spp. was made.

Comment: When it comes to outbreaks of infectious causes of sheep abortion in this country the big three of Toxo, Campy and *Salmonella brandenburg* account for 80% of diagnosed cases. So it is often a surprise when something else turns up. It is even more of a surprise (and a disappointment!) when no causative agent is identified, especially in cases where large numbers of ewes are affected and gross lesions are readily seen on autopsy of the foetuses. Such cases have been encountered in the South Island (from Canterbury south) from time to time, over the last twenty years or so. Some have involved hundreds of ewes. This paper gives an account of both the history of these cases and the work done in trying to identify the cause. These efforts eventually culminated in the identification of Helicobacter in 2010. Readers will be heartened to learn that Gribbles Veterinary is currently working on a diagnostic test for this disease which will hopefully be available soon.

Reference: Proceedings of the Deer Branch of the New Zealand Veterinary Association, Proceedings of the Society of Sheep and Beef Veterinarians of the NZVA and Cervetec Conference 309, pp 213–216, Jan 2015
Abstract

Disease features and diagnostic sampling of cattle and sheep postmortem examinations

Authors: Otter A & Davies I

Summary: Post-mortem examinations of cattle and sheep are a potential source of useful information in the investigation of disease outbreaks on farms. This article discusses some of the key disease features and problems that might be encountered by the veterinary practitioner performing a post-mortem examination on cattle or sheep, and provides guidance on appropriate sample selection.

Comment: "In Practice", an official journal of the British Veterinary Association published in conjunction with the Vet Record, is a fantastic source of veterinary continuing education with emphasis on concise, practical articles that are usually enhanced with plenty of useful photographs and diagrams. This very comprehensive, well set out article, on sheep and cattle post-mortem examinations is a good example. As production animal vets, carrying out autopsies on livestock is a common task and maybe something that we don't feel we need any guidance on. But from time to time it doesn't hurt to take time to read something like this and remind ourselves of all the little things that we may have forgotten or overlooked as, inevitably, we take shortcuts to get the job done quickly and because, in most cases, a really thorough post-mortem examination may not always be needed. This particular article goes well beyond the actual autopsy itself with sections covering history taking, case selection, and examination of the environment. There is helpful advice on the taking of samples as well. The main body of the article goes step wise through the various organs and is accompanied by plenty of pictures, each of which, as an additional bonus, can be readily converted into a power point slide with the click of the mouse. Great for those farmer presentations. Obviously, being a UK publication there are references to diseases and conditions not seen here but that does not detract from the value of the article. In fact, the chapter on "Legislation and Carcass Disposal", while totally irrelevant for us, was an interesting read and reminded me how lucky we are to be working in New Zealand!

Reference: In Practice. 2015;37:293–305
Abstract

Parasiticide resistance in flies, lice and ticks in New Zealand and Australia; mechanisms, prevalence and prevention

Authors: Heath A & Levot GW

Summary: These authors concisely review the history of parasiticide resistance in the principal ectoparasites of sheep and cattle in New Zealand and Australia, i.e. blowflies, buffalo fly (*Haematobia irritans exigua*), sheep biting louse (*Bovicola ovis*), and cattle ticks. Recent changes in the response of these ectoparasites to insecticides and acaricides are also discussed as are alternative methods of ectoparasite control and recommendations for their integration into preventative programmes.

Comment: As sheep and beef practitioners we are all very familiar with anthelmintic resistance. It's a bread and butter topic at our conferences. Thanks to a number of surveys we have a reasonable handle on the extent of the problem. The potential costs to our clients have been demonstrated. And, of course, we are well versed in the art of delaying its development and minimising its impact. But when it comes to resistance to our external parasiticides it's an entirely different ball game. Speaking from personal experience, discussing possible dip failure or unsatisfactory fly control with a client is a lot more of a challenge than having a discussion on drench resistance. Perhaps, in my case, it's a function of living in a region where fly strike is not a widespread problem and where the vast majority of lice treatment is done by dipping contractors, so we are not particularly conversant in this whole topic. So, for me, this review article by Wallaceville louse guru Alan Heath, and his Australian counterpart, is an enlightening and comprehensive summary of where we are at with external parasiticide resistance. Dealing with each important parasite one at a time (you can skip the bit about the Buffalo fly if you are not planning on working in Australia) the authors give a compact account of the resistance history and current status of the various chemical groups used to control each one. This is followed by an excellent section on managing resistance with the three key strategies remarkably similar to those recommended for internal parasites. These strategies are summarised in the form of key messages in a punchy conclusion, which also includes a kick up the arse for vets like me, urging us to "take the initiative and promote ectoparaiste treatments and sheep management systems that maximise effective insecticide use while minimising the risk of selection pressure leading to resistance". Up for the challenge?

Reference: N Z Vet J. 2015;63(4):199–210
Abstract

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Comparison of the efficacy of two different treatment regimens of long acting doramectin injection (Dectomax® Injection) combined with an oral levamisole in cattle

Author: Bingham C

Summary: The objective of this single site, positive control, comparative productivity study was to determine the best protocol for combining short-acting oral drenches with a long-acting doramectin injection. The study was conducted on a commercial sheep and beef property in the central King Country of New Zealand. The assessment of productivity was based on body weights, which were recorded at the start of the trial and every 21-28 days thereafter for 105 days. The results indicated that, in the presence of severe *Cooperia* spp. macrocyclic lactone (ML) resistance (and *Ostertagia* ML resistance), the combination of a short-acting oral drench with a long-acting doramectin injection is an effective treatment option. The combination eliminated the parasite burden within the animals and, when repeated at 7-8 weekly intervals, produced cattle of weight equivalent to a more intensive 3-4 weekly programme. The ability to extend the drenching interval reduced the cost and quantity of drench used and produced significant savings in the time required to muster and treat the animals.

Comment: ML resistance in *Cooperia* spp, has been shown to be widespread in New Zealand cattle herds. To control these worms, while also maximising control over other important species such as lungworm and *Teladorsagia* (*Ostertagia*) spp., it is now common practice to use anthelmintics in combination in our young cattle, both beef and dairy. However, while a number of ML products are available that offer persistent activity, we have no persistently-acting levamisole or benzimidazole options. Consequently, many farmers are currently treating their young cattle every four weeks over the summer and autumn. Not only can this be a costly exercise, but monthly yarding of these animals can be a time-consuming job especially on our larger and more extensive properties. Using a farm with known ML resistance to two worm families (A FECRT resulted in *Ostertagia* spp. levels being reduced by only 75% with *Cooperia* spp. levels not being affected at all), this study investigated the viability of extending the drench interval out to eight weeks when a persistently-acting ML (doramectin) was used in combination with oral levamisole. The results were encouraging, indicating that such a strategy was effective, with both faecal egg counts and growth rates of the cattle involved comparing favourably with those from two other programmes each of which involved four weekly treatments.

Reference: Proceedings of the Society of Sheep and Beef Cattle Veterinarians of the New Zealand Veterinary Association, Proceedings of the Society of Sheep and Beef Veterinarians of the NZVA and Cervetec Conference 309, pp 121–126, Jan 2015
Abstract