An Introduction to Sustainability in Farm Vet Practice

A Case Study Series Compiled by the Vet Sustain Food and Farming Working Group

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Contents

Introduction

As members of the vet-led team involved in animal agriculture, we would all argue the essential role that sustainable farming systems play in the climate crisis. As our first piece produced by the Vet Sustain Food & Farming Working Group we were keen to champion steps already being taken by vets in practice towards a more sustainable future for all. As trusted farm advisors much of our dialogue is looking at the performance of businesses today whilst ultimately ensuring the longer term success and viability. The veterinary profession sits at the intersection of human, animal and environmental health and we as advisors are best placed to address the many issues faced by our clients.

This document has been composed to demonstrate that even when environmental impacts of our decisions are not always at the forefront, a progressive health strategy could have reciprocal benefits for health, welfare, the environment and ultimately the financial success of the farm businesses we work alongside. As we are a small group, we have unashamedly used our existing veterinary networks to create this document. We are fully aware that its content does not cover all aspects of farm animal practice, but its intent is more to illustrate some of the areas we can positively influence, in addition to serving as an engagement piece to raise awareness, and to stimulate further thought and debate within the profession.

Vet Sustain is a UK-based social enterprise working to enable and inspire veterinary professionals to help secure the wellbeing of animals, people and the natural world. We produce tools, training and communications for veterinary professionals centred around our six Veterinary Sustainability Goals, aligned with the UN's SDGs. www.vetsustain.org

Produced in Partnership with ***VetSalus*** - a global network of veterinary consultants working with food producers to improve animal health, welfare and sustainability. www.vetsalus.com

Photo credit - Holly Anne Hills

The environmental impact of antimicrobials

Alasdair Moffett BVMS, MSc, MRCVS, Veterinary Surgeon at Synergy Farm Health

Multiple pathways exist for antibiotics to enter the environment. A 'One Health' perspective that incorporates the complex relationship between animals, humans and the environment is therefore essential to tackle antimicrobial resistance, (AMR) effectively. The whole AMR story has driven the sort of vetting we all aspire to do, and the vetting which should form part of our future. Working together with farmers to produce healthy productive livestock, whilst minimising the need for antimicrobial intervention is the goal for each, and every one of us.

Antibiotic use in animal agriculture

There is a current lack of data on how on farm use of antibiotics specifically affects the presence of resistance genes in bacterial communities (the resistome) in the immediate farm and wider environment. This is currently a project under way with Synergy Farm Health and the RVC.

Limiting the use and types of antibiotics in animal production, particularly those of greatest importance to human health, is the most direct mechanism for controlling agricultural antibiotic release into the environment, and likely also antibiotic resistance.

Animal Health

Keeping animals healthy is key to reducing the necessity for antibiotic treatment. Knowledgeable animal husbandry is cited as the most important factor in reducing antibiotic use, but other management practices, such as correct stocking density, improved nutritional programmes, vaccination strategies, optimal housing and ventilation, slurry management and genetic selection can all be adopted to minimise the need for antibiotic use.

Reducing prophylactic use also has a key role: for example the last 5-10 years have seen a shift from routine intramammary treatment of all cows at dry-off, to selective treatment based on pre-existing mammary infections.

Antibiotic alternatives

Metals such as copper, zinc, or arsenic are commonly used in animal feeds as alternatives to antibiotics. However, antibiotic resistance can be co-selected by metals, and the bio-accumulation in soils (notably of copper) both potentially limit the contribution of their use in tackling AMR. Other alternatives, such as herbal materials, may be worth pursuing, although by definition, their antimicrobial activity can also select for resistance.

Antibiotic waste

A significant proportion of antibiotics (17%–90% for livestock) are excreted directly into urine and faeces, unchanged or as active metabolites. These antibiotics may persist in the environment for periods that can range from a few days (e.g. beta-lactam antibiotics) to several months (e.g. fluoroquinolones). **Livestock manure is therefore a potential source of environmental antibiotic contamination**.

Composting can alleviate the problem, with degradation primarily occurring during the thermophilic phase in the first two weeks. Containment of animal wastes is a further practical strategy with the additional advantages of nutrient management and protection of soil and water quality. Containment strategies include prevention of lagoon spills and seepage, and manure application to land only when crop demands for water and nutrients are high, to limit surface runoff.

Photo credit - Rob Howe

Reference Materials:

Bengtsson-Palme, J., Kristiansson, E. and Larsson, D.J. (2017). Environmental factors influencing the development and spread of antibiotic resistance. FEMS Microbiology Reviews 42(1). doi:10.1093/femsre/fux053.

Laxminarayan, R., Duse, A., Wattal, C., Zaidi, A.K., Wertheim, H.F., Sumpradit, N., Vlieghe, E., Hara, G.L., Gould, I.M., Goossens, H. and Greko, C. (2013). Antibiotic resistance—the need for global solutions. Lancet Infectious Diseases 13(12):1057–98. doi:10.1016/S1473-3099(13)70318-9.

McEwen, S.A. and Collignon, P.J. (2018). Antimicrobial Resistance: A One Health Perspective. Microbiology Spectrum 6 (2). doi:10.1128/microbiolspec.ARBA-0009-2017.

Nijsingh, N., Munthe, C. and Larsson, D.G.J. (2019). Managing pollution from antibiotics manufacturing: charting actors, incentives and disincentives. Environmental Health 18, 95. doi:10.1186/s12940-019-0531-1.

O'Neill J. (2014). Review on antimicrobial resistance. Antimicrobial resistance: tackling a crisis for the health and wealth of nations 2014. Accessed via: AMR Review Paper - Tackling a crisis for the health and wealth of nations_1.pdf (amr-review.org)

Pruden, A., Larsson, D.G.J., Amézquita, A., Collignon, P., Brandt, K.K., Graham, D.W., Lazorchak, J.M., Suzuki, S., Silley, P., Snape, J.R., Topp, E., Zhang, T. and Zhu, Y-G. (2013). Management options for reducing the release of antibiotics and antibiotic resistance genes to the environment. Environmental Health Perspectives 121: 878-885. doi:10.1289/ehp.1206446.

Sustainable heifer rearing for a longer productive life

Charlotte Debbaut DVM MRCVS, Veterinary Surgeon, Synergy Farm Health

One of the pillars of a sustainable dairy industry is efficient heifer rearing. Efficient rearing will not only reduce the cost and resources used but will also prolong the heifer's productive lifetime in the milking herd. The average productive life of a Holstein Friesian in the UK currently stands at three lactations. To create a sustainable dairy industry, we should aim for an average of five lactations. **The goal is to grow a healthy heifer that calves down at 23 months at 85% of adult body weight.** Calving heifers down at the right age and size gives them a solid base to start a longer productive life.

The figures in Table 1 indicate that an average age at first calving of 23 months increases lifetime production, and reduces methane produced during the rearing period.

Age at first calving	Lifetime production (kg)	Total methane produced (kg)
22 months	31.230	76.77
23 months	**38.345**	**82.12**
24 months	36.154	87.92
25 months	32.085	93.92
26 months	21.465	99.96
27 months	19.960	106.22

Tabel 1. Heifer age at first calving, in association with lifetime milk yield, and total methane emissions. Adapted from CowSignals®

Reaching the target of 85% of adult bodyweight by 23 months of age rests on two principles:

- **optimising growth rates**
- **reducing production loss through disease**

There are several tools available to achieve this and a few easy to implement examples are discussed below.

Feed conversion is highest during the first few weeks of life, so **to reach an average growth rate of 0.8kg/day throughout the rearing period, the milk phase needs to be optimised.**

Furthermore, it has been shown that 100g increase in average daily gain during the first months of life leads to an extra 225kg of milk produced during the first lactation[1]. A minimum of 1000g daily of good quality milk replacer is needed for optimal calf immunity and health. To achieve the target of doubling the birth weight by 8 weeks for weaning, it is advisable to go up to 1200g of milk replacer daily.

Respiratory disease is one of the main causes of calf mortality, it also reduces growth rates and has long term detrimental effects on productivity. A case of pneumonia in a calf less than 3 months old delays age at first calving by 2 weeks and reduces first lactation milk yield by 2%[2].

Decent housing is pivotal for pneumonia prevention and there are many aspects to this. Without getting the sledgehammer out, pneumonia rates can be reduced by addressing stocking density and group sizes. In a group of unweaned calves, providing 2.5m^2 per calf should be a minimum, and space provisions of 3m^2 or more can result in a dramatic reduction in incidence of respiratory problems. Animals housed in groups sized 8 or below have reduced respiratory issues in comparison to calves raised in larger groups of 10-20[3]. This is in part due to a reduction in transmission rates and smaller group sizes result in less social stress for the calves.

Long term effects of pneumonia can be reduced greatly by prompt detection and proper treatment. The use of a respiratory scoring card for farm staff reminds them to look for all signs of pneumonia. Subtle symptoms, like an ear droop or tear stain, are often overlooked resulting in delayed treatment. The scoring also prevents overuse of antibiotics in mild cases that could be treated with an anti-inflammatory alone.

Importantly, we can only monitor progress through good record keeping, an area often neglected in heifer rearing. Recording growth rates and colostrum intakes is advised, however not all farms engage in this. A lot of information can already be obtained from accurate disease and treatment records for individual age groups, helping us to focus on problem areas that require further investigation. Tools are available for digital youngstock record keeping, but this could be a hurdle on some farms. As a vet we can help by providing templates with the records we are interested in, tailored to the age category we want to focus on.

Reference Materials

[1] Bach, A. (2012) ‘Ruminant nutrition symposium: optimizing performance of the offspring: Nourishing and managing the dam and postnatal calf for optimal lactation, reproduction, and immunity’, Journal of Animal Science, 90 (6), pp. 1835-1845.

[2] Van der Fels-Klerx, H. Saatkamp, H. Verhoeff, J. Dijkhuizen, A. (2002) ‘Effects of bovine respiratory disease on the productivity of dairy heifers quantified by experts’, Livestock Production Science, 75 (2), pp. 157-166.
Van Laar et al. (2004), Van Straalen (2006)

[3] Bach, A. Ahedo, J. (2008) ‘Record keeping and economics of dairy heifers’ Veterinary Clinics of North America: Food Animal Practice, 24 (1), pp. 117-138.

The environmental impact of mastitis in the dairy herd

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Mastitis is just one example of an endemic disease with both direct and indirect impacts on greenhouse gas (GHG) emissions. Losses include reduced yield, involuntary culling, discarded milk, vet and medicine costs, labour, penalties and knock on effects, usually on fertility. But while the losses add up, the inputs tend to remain the same.

Estimated costs range from 0.6-6.6ppl of milk produced[1] and **the environmental cost can be attributed to increased resource use and GHG emissions per unit of output.** Antimicrobial use also adds to the impact on the ecosystem and is a significant contributor to the antibiotic treatments administered to dairy cows. Mastitis is also a painful condition leading to compromised welfare.

It has been calculated that reducing the incidence of clinical mastitis from 25% to 18% and reducing sub-clinical mastitis incidence from 33% to 18% yielded a 2.5% decrease in GHG emissions[2].

Therefore, **vets have a vital role to play in mastitis control in order to reduce the environmental impact of dairy production through improved efficiency.**

References Materials:

[1] Green M.J., Hudson C.D., Breen J.E., Bradley A.J. The true costs of mastitis. Br. Mastit. Conf. 2009; Stoneleigh Park. Warwickshire, UK, 14th Oct. 2009; 2009. [Google Scholar]

[2] Hospido A, Sonesson U. The environmental impact of mastitis: a case study of dairy herds. Sci Total Environ. 2005 May 1;343(1-3):71-82. doi: 10.1016/j.scitotenv.2004.10.006. Epub 2004 Dec 2. PMID: 15862837.

Beef fertility, breeding, advanced breeding, and genomics

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Optimising fertility is critical to the success of any suckler herd, and many aspects are in the veterinary arena including nutrition, health, breeding and genetics. Livestock vets are integral to work alongside their clients in order for them to be productive, profitable and efficient. **Ways in which efficiency can be optimised include herd health plans, preventing infectious diseases, bull fertility testing, mobility scoring, pregnancy diagnosis and body condition scoring.** Maximising efficiency will result in measurable success for a beef farmer; for example kg of beef sold per cow.

Artificial insemination (AI) provides access to the best bulls in a biosecure way, underpinning its success. However the limitation lies in the ability to only get one calf from heifers or cows with fantastic potential; 'flushing' cows, and subsequent embryo transfer (ET) into recipients was the first method developed to overcome this hurdle.

More recently, embryos have started to be produced by ovum pickup (OPU - a vet only procedure), in vitro fertilisation (IVF) and in vitro production (IVP). As the success of both methods improves, cost subsequently falls; research is ongoing to refine biopsy techniques of embryos, allowing their genomic evaluation prior to transferring. Once commercial, breeders will be able to acquire sexed embryos with specific traits, whether that be high immune status, longevity, health characteristics, productivity disease resistance, production potential, liveweight gain etc.

Genomics links directly with sustainability through:

- *Production efficiency - particularly solids, growth rates and carcass kill out percentage*
- *Feed efficiency - including nitrogen utilisation and methane reduction*
- *Maintenance requirements - smaller animals need lower maintenance for the same production*
- *Improved fertility and disease resilience*

Genomic screening advances are resulting in improved and more specific indexes, including looking at the likelihood of common diseases in heifers. In the future it is likely we will have genomic indexes that are proxies related to climate change and the environment, for example methane emissions.

When talking about "precision agriculture" many papers focus on arable systems; if livestock are mentioned it is only usually as biosensors or diagnostics. Yet the most precise thing we could do is to breed more efficient and healthier animals.

By using technologies like genomics, ET, OPU/IVF we can amplify the genetic gain by producing embryos from the most suitable animals and by these means rapidly improve the genetics of the national herd.


Photo credit - Paragon Veterinary Group

Reference Materials:

AHDB Better Returns Programme: https://beefandlamb.ahdbdigital.org.uk/returns/breeding/

Veterinary Engagement in Sustainable Pig Farming

Tom Hill BVSc MRCVS and Ed Bailey BVSc CertAVP (Cattle) MRCVS, George Vet Group

Pork production can be a highly sustainable form of livestock production, based on the ability of the pig to thrive on a wide range of diets. By-products from the food industry, crop residues and cereals which don't make the grade for human consumption can be transformed into meat much more efficiently by pigs than by ruminants. For millennia humans have used the ability of pigs to turn waste or over-abundance into a versatile meat which is a cornerstone of many national cuisines. Feed use is the main driver for global warming potential and so feed efficiency and feed sourcing are critical factors for sustainability. The land sparing versus land sharing arguments apply here, with diets lower in imported soya potentially resulting in reduced emissions but higher land use area[2 3]. Pigs may play an important role in mixed farming operations as we seek to improve our diets and soil health, while reducing our environmental impacts from food production[4].

The pig veterinary sector is relatively small but has led the way in positioning itself as a highly integrated source of independent specialist expertise for proactive farmers.

As commercial pig vets, the aim is to produce the healthiest pigs, with the highest welfare, and as efficiently as possible. Progress with feed conversion efficiency and daily liveweight gain has had a big impact on sustainability, with greenhouse gases per unit of product reduced by 37% between 2000 and 2017[1]. Feed makes up 60-80% of the carbon footprint of pork and so even very small changes to feed conversion rate can make major impacts.

Pig vets have a key role in driving these efficiencies. This has been achieved with a background of high welfare and a much higher proportion of UK producers raising pigs outdoors compared with other major producers[1].

Historically antibiotic use has been high, but progress in reduction has been remarkable. Antibiotic use averaged 278mg/PCU in 2015 but has reduced by over 60% to 110mg/PCU in 2019[5]. RUMA, PVS and many other stakeholders are working hard to reduce this further. Use of AHDB's electronic medicine book has allowed vets to graphically show farmers their usage, and how they compare with similar producers. This benchmarking has opened discussion and is a real driver for reduced antibiotic usage.

Photo credit - Helen Bowning Organics

Gut health is of huge importance in the growing pig as a healthy gut will take up nutrients more readily, improving feed conversion efficiency and consequently reducing days to slaughter. Zinc oxide is often used for its bacteriostatic properties in weaner diets to help combat post-weaning diarrhoea. Zinc oxide is a POM-V medicine and so its use is already tightly regulated. The EU are proposing a ban on use of therapeutic zinc oxide in June 2022. It remains to be seen whether UK regulations will follow suit. Vets will be instrumental in assisting farmers to manage any transition without an increase in disease rates by applying their understanding of the overall disease process.


Photo credit - Helen Browning Organics

Reference Materials:

[1] Centre for Innovation Excellence in Livestock (CIEL) 2020. Net Zero Carbon and UK Livestock. Accessed via: https://www.cielivestock.co.uk/wp-content/uploads/2020/09/CIEL-Net-Zero-Carbon-UK-Livestock_2020_Interactive.pdf

[2] Rauw, WM, Rydhmer, L, Kyriazkis, I, et al (2020) Prospects for sustainability of pig production in relation to climate change and novel feed resources. Journal of the Science of Food and Agriculture doi:10.1002/jsfa.10338

[3] Rowntree JE, Stanley PL, Maciel ICF, et al. (2020) Ecosystem Impacts and Productive Capacity of a Multi-Species Pastured Livestock System. Frontiers in Sustainable Food Systems. doi:10.3389/fsufs.2020.544984

[4] Food, Farming and Countryside Report (2021) Farming for Change. Accessed via: https://ffcc.co.uk/assets/downloads/FFCC_Farming-for-Change_January21-FINAL.pdf

[5] UK Veterinary Antimicrobial Resistance and Sales Surveillance (VARSS) (2020) 2019 Report. Available at https://www.gov.uk/government/publications/veterinary-antimicrobial-resistance-and-sales-surveillance-2019

The flock health plan and the environment: Adversary or Advocate?

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The health of the environment and the health of the business are intertwined. When considering the carbon footprint of lamb we know that key drivers of greenhouse gas cost include: reduced number of lambs reared per ewe to the tup, reduced growth rates in lambs, dry ewes per annum (linked to ewe lamb fertility) and increased concentrate usage. Equally these metrics are units of assessing the physical performance of the flock. For many flock health conundrums, we can demonstrate an economic and environmental benefit. Here are just two examples:

Photo credit - Alice Geddes

Anthelmintic resistance is widespread in the sheep sector with multi-anthelmintic resistance frequently demonstratable on farms. Reducing the need to use anthelmintics, the frequency of use and proportion of sheep treated are key in reducing the rate of resistance development. By utilising pasture rotation strategies, maximising immune capability through general health, genetics and nutrition, exposure of sheep to parasite burdens can be reduced.

Positive environmental impacts include:

- *improved growth rate*
- *reducing the carbon cost of production*
- *reducing the number of anthelmintic doses used per annum*
- *reducing environmental exposure of invertebrates*

Sheep scab can have impacts on the body condition score and by proxy, fertility, milk yield and growth rates of lambs. Treatment either through topical products or systemic injectables potentially risks some environmental chemical exposure when managed poorly. A strict quarantine policy when buying sheep, the use of serology pre-purchase of animals, investing in boundary control and robust personal biosecurity can reduce the risk of introduction.

Preventative strategies positively affect the environment because: they maintain animal health and welfare ensuring reduced performance wastage and the need for whole flock treatment.

Robust treatment strategies positively affect the environment because: they permit recovery of performance (body condition, milk yield, growth rates etc) and improved efficiency of production reducing carbon cost of lamb produced.

Reference Materials:

Centre for Innovation Excellence in Livestock (CIEL) 2020. Net Zero Carbon & UK Livestock. Accessed via https://www.cielivestock.co.uk/net-zero-carbon-and-uk-livestock/

Centre for Innovation Excellence in Livestock (CIEL) 2020. Net Zero Carbon and UK Livestock. Accessed via: https://www.cielivestock.co.uk/wpcontent/uploads/2020/09/CIEL-Net-Zero-Carbon-UK-Livestock_2020_Interactive.pdf

Gascoigne, E. and Lovatt, F., 2015. Lamb growth rates and optimising production. In Practice, 37(8), pp.401-414.

Glover, M., Clarke, C., Nabb, L. and Schmidt, J. 2017. Anthelmintic efficacy on sheep farms in south-west England. Veterinary Record, 180, 378. doi: 10.1136/vr.104151.

Jones, A.K., Jones, D.L. and Cross, P., 2014. The carbon footprint of UK sheep production: current knowledge and opportunities for reduction in temperate zones. The Journal of Agricultural Science, 152(2), 288.

Integrated Parasite Management (IPM) - Harnessing the Power of Dung Beetles

Rob Howe BVSc MRCVS, Veterinary Surgeon / Director, LLM Farm Vets

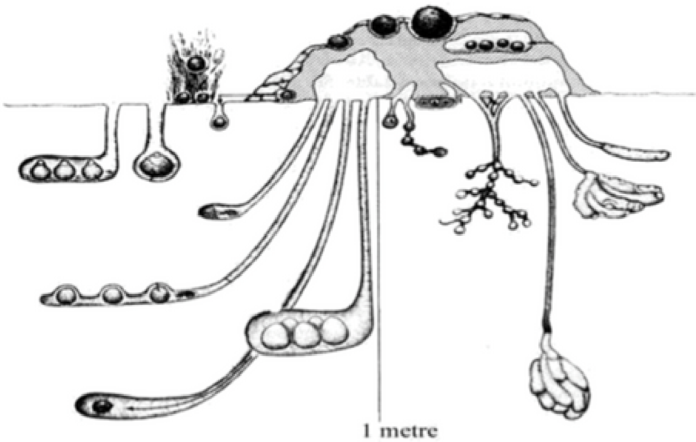
Parasitic disease is of huge importance in ruminant species. Gastrointestinal nematodes, liver fluke and lungworm combined are estimated to cost the European countries £1.8billion annually. Production accounts for 81% of this and 19% in treatment costs[1].

Current control is largely based on anthelmintics, commonly applied indiscriminately. This accelerates resistance leading to further production losses, but also means this approach has a limited life-span. Indiscriminate use also prevents youngstock generating immunity[2], wastes money on unnecessary product[3] and has large impacts on agri-environment biodiversity[4] and soil health.

The unintended consequences of prophylactic use of macrocyclic lactone (ML) and synthetic pyrethroid (SP) anthelmintics upon tunnelling dung beetles[4] and a vast array of other beneficial insect species is becoming more widely appreciated as is the fact insect population decline of 24% over the last 30 years is now at food and ecosystem critical levels[5].

The UK has ~50 dung beetle species, which are calculated to save the cattle industry £367 million a year[6]. This is illustrated well by Australia having to import and release beetles simply to cope with its introduced cattle. The true value of dung beetles is likely to be even higher than this quite staggering estimate, because they provide more services not included in the model such as flood mitigation, increased carbon sequestration & biodiversity.

Unfortunately, dung beetles are in decline which represents a threat to farm productivity. This decline is partly but significantly a result of over-use of anthelmintics; MLs and SPs in particular. These are lethal to aquatic life and many insect species. Not only are the active ingredients lethal at very low doses, but they also remain in the environment for a long time and can even reduce plant growth by 18%.



Doube, B. M. 1990. A functional classification of the structure of dung beetle assemblages. Ecological Entomology 15:371-383.

We have two functional groups here in the UK. 'Tunnellers' and 'Dwellers'.

Tunnellers (Paracoprids) dig, burying the dung up to a metre below ground, where they lay eggs and where their larvae can develop safe from predation.

Dwellers (Endocoprids) neither roll, nor burrow. They simply live their entire lives in manure and in large numbers can 'shred' a pat in days.

Each species has their own habitat, with the more species present on-farm working synergistically creating the full array of benefits. They also provide an important food source for birds, bats and mammals at a time when biodiversity is becoming a crucial public benefit, linked with future of subsidy (e.g. Environmental Land Management Scheme) and many aligned contracts. For this reason alone, IPM should be a founding block of any farm biodiversity action plan.

Dung beetles provide some incredibly useful services to livestock health and production for vets and farmers to take note of:

- Reduce parasitic nematode availability by 30%[7]
- Speed up dung removal, reducing numbers of nuisance flies, parasites and thus animal diseases, which further reduces need for treatments
- Increase soil organic matter and nutrient cycling by dragging down dung (fertilises soil)
- Improve productivity of the land (more grass growth and less pasture covered in dung)
- Increase soil aeration and structure (through creation of tunnels)
- Improve rainwater infiltration (reducing erosion, nutrient loss and flooding)


Photo credit - Rob Howe

The good news is that farm vets can do something about this, creating positive outcomes for animal health, farmers, the environment and vet practices. A trial[3] conducted by the author and colleagues (LLM Farm Vets 2020) comprised 18 dairy farms, clearly demonstrated avoidance of prophylactic anthelmintic use is readily and safely achievable in practice. ML use was eliminated in 50% herds and reduced in all. In 40% of herds undertaking IPM, no grazing anthelmintics were necessary at all. This work is being expanded and written up in more detail in 2021/22.

Integrated parasite control requires drive to get up and running and a whole team approach to collect samples and provide advice and support throughout the season. There are so many practice benefits, if not already offering it as a service;

- ***Positive action in helping agri-environment and the image of farming practice***
- ***New or extended services; integrated parasite control planning, FEC services, youngstock health initiatives including growth rates, dung beetle and other biodiversity surveys, soil health opportunities***
- ***Increased potential revenues from product sales - vaccines and anthelmintics***

Reference Materials:

[1] Charlier, J., Rinalid, L., Mussella, V., et al. 2020. Initial assessment of the economic burden of major parasitic helminth infections to the ruminant livestock industry in Europe. Prev Vet Med 182:105103. doi: 10.1016/j.prevetmed.2020.105103.

[2] Ravinet, N., Chartier, C., Merlin, A., Lehebel, A., Brisseau, N., Quenet, Y., Bareille, N., and Chauvin, A. 2018. Résistance des strongles digestifs aux anthelminthiques et gestion des refuges chez les bovins: des résultats récents pour le traitement ciblé-sélectif des génisses et des vaches adultes en troupeau laitier. JNGTV 2018 in France. Accessed via: Résistance des strongles digestifs aux anthelminthiques et gestion des refuges chez les bovins : des résultats récents pour le traitement ciblé-sélectif des génisses et des vaches adultes en troupeau laitier - Institut National de Recherche en Agriculture, Alimentation et Environnement (inrae.fr)

[3] R Howe, LLM Farm Vets 2020. Integrated parasite control at the practice level. Pilot study outcomes 2020 (unpublished).

[4] Sands, B., and Wall, R. 2018. Sustained parasiticide use in cattle farming affects dung beetle functional assemblages. Agriculture, Ecosystems and Environment, 265, 226-235. https://doi.org/10.1016/j.agee.2018.06.012.

[5] van Klink, R., Bowler, D.E., Gongalsky, K.B., Swengel, A.B. Gentile, A. and Chase, J.M. 2020. Meta-analysis reveals declines in terrestrial but increases in freshwater insect abundances. Science 368, 417-420. doi: 1126/science.aax9931.

[6] Benyon, S.A., Wainwright, W.A. and Christie, M. 2015. The application of an ecosystem services framework to estimate the economic value of dung beetles to the U.K. cattle industry. Ecological Entomology 40, S1, 124-135. doi: 10.1111/een.12240.

[7] Sands, B. and Wall, B. 2017. Dung beetles reduce livestock gastrointestinal parasitic availability on pasture. Journal of Applied Ecology, 54, 1180-1189. doi: 10.1111/1365-2664.12821.

Talking all things carbon

Alasdair Moffett BVMS, MSc, MRCVS, Veterinary Surgeon at Synergy Farm Health

The Centre for Innovation Excellence in Livestock (CIEL) published a Net Zero Carbon and UK Livestock Report in September 2020.

Currently, UK ruminant production greenhouse gas emissions compare favourably against global averages for similar systems (see CIEL 2020), suggesting that reducing production and exporting carbon emissions abroad would not contribute effectively to achieving net zero.

The main sources of greenhouse gases (GHGs) arise from enteric methane, feeding, manure management and fertilizer application, followed by primary energy use (diesel and electricity). In 2018 livestock emissions (29.1Mt CO2 -eq) represented 63% of all UK agricultural GHG emissions.

The recommendations for reducing GHG emissions are not unfamiliar to production animal vets. Improving efficiency of production, whether by maintaining an age of first calving for dairy and suckler production of 23 months (as Charlotte Debbaut mentions elsewhere in this document), maintaining a calving interval of 385 days or less, reducing days to finishing (i.e. improving Daily Liveweight Gain) can all help improve the carbon footprint per unit of production. Improvements in animal health can also make significant gains – for example lambs infected with Teladorsagia circumcincta can result in an increase of GHG emissions of up to 33%, and BVD can increase suckler herd's GHG emissions by over 100%.

Reducing the use of inorganic fertilisers when producing forage, and effective utilisation of manure are additional key areas to target. Finally, improving genetic selection of ruminant livestock to boost fertility, feeding efficiency and health through improved immunity to common diseases can contribute to a reduction in carbon emissions, combined with gains in profitability.

End Note: Measuring methane and its carbon equivalence is a topic of hot debate, relating to the relatively short half-life of methane, which is not captured by current metrics. For those interested, see Frontiers | Agriculture's Contribution to Climate Change and Role in Mitigation Is Distinct From Predominantly Fossil CO2-Emitting Sectors | Sustainable Food Systems (frontiersin.org), and Climate change, ruminant methane and GWP — Vet Sustain for further discussion on this topic.*

References and further reading:

Centre for Innovation Excellence in Livestock (CIEL) 2020. Net Zero Carbon and UK Livestock.
Accessed via: https://www.cielivestock.co.uk/wp-content/uploads/2020/09/CIEL-Net-Zero-Carbon-UK-Livestock_2020_Interactive.pdf

Veterinary engagement with the organic sector - lessons we can learn from each other

Ed Bailey BVSc Cert AVP (Cattle) MRCVS, George Veterinary Group

The Soil Association has always led the way in advocating prudent use of antibiotics, banning routine use, and setting high standards of welfare and husbandry to prevent diseases which might require treatment. In recent years, the livestock farming sector as a whole has made huge improvements in this area, showing a 48% reduction in tonnes used in 2019 compared with 2014. Retailers have also started to lead the way in pushing their producers to adopt husbandry methods which use much fewer antimicrobials.

How can we as vets remain at the centre of the One Health movement, advocating for higher welfare, minimal need for antibiotics and diets which are healthy for people and planet?

Photo credit - Humphrey Wells, FAI Farms

The Soil Association undertook a benchmarking exercise to establish levels of antibiotic use in all classes of organic livestock, due to be published in 2021. This showed the average usage by licensees in all sectors to be substantially lower than even the reduced national average, indicating that organic standards may be a blueprint for further reductions.

The second part of the survey was a series of qualitative interviews with organic farmers in which there was overwhelming evidence that an individual trusted vet was by far the most influential source of advice with respect to health, welfare, and medicines. Many farmers had undergone a personal journey in attitudes and beliefs around reducing reliance on treatments and had felt well supported by their vet. The standards, certification and inspection were useful for setting the goalposts, but veterinary engagement with the daily practicalities and a willingness to be open-minded and learn from each other were the keys to success.

As the farming sector moves post-Brexit into a need to embrace Environmental Land Management Schemes, regenerative agriculture, carbon sequestering and pro-biodiversity practices, we have an opportunity as trusted advisers to equip ourselves with the knowledge to support them. Opportunities to engage with organisations such as the Soil Association with their depth of resources and experience in these areas will help us meet these fulfilling goals.

Reference Materials:

UK Veterinary Antimicrobial Resistance and Sales Surveillance (VARSS) (2020) 2019 Report.
Available at https://www.gov.uk/government/publications/veterinary-antimicrobial-resistance-and-sales-surveillance-2019 [accessed 10.2.21]

Regenerative agriculture, agroecology, and the veterinary profession

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Regenerative agriculture is gaining momentum in the UK, especially in the sheep and beef sectors. Off the cuff snippets that are often voiced relating to regenerative agriculture include reductions in veterinary medicine usage – antibiotics and wormers in particular, and a reduced need for emergency or reactive veterinary interventions. Instead of viewing this as a closing door, we at Vet Sustain wish to embrace these principles, and celebrate the role of the vet as the go-to adviser specialising in livestock health and welfare, but with a whole farm understanding.

We want to help equip the profession to be able to engage confidently with the principles of regenerative agriculture, so that the door to clients who are considering or already practising regenerative agriculture is not closed – quite the opposite.

Photo credit - Humphrey Wells, FAI Farms

Truly regenerative agriculture is not a step back to past practices. It is a step forwards to integrative practices that recognise and understand the importance of the connectedness of soil health, plant health, animal health and human health. Key principles include minimising soil disturbance, maximising pasture biomass and diversity, maximising positive effects of animal impact, overall managing for greater biodiversity both above and below the ground. Crucially, regenerative systems measure success across environmental, ethical and economic domains, giving both animals and humans a *good life*.

Applying context specific regenerative agroecological principles to conventional farm production models involves a system transition, which, by its very definition, can be challenging. It can be our role as vets to support and assist farmers during these transitions to safeguard and optimise livestock health and welfare. But to be effective in this role we need to be fully equipped to do so.

It is our intent at Vet Sustain to provide training and support for the profession to achieve this. We are looking to develop modules that, for example, debunk some of the myths around regenerative agriculture, explain some of the key concepts, and how they apply to animal health and welfare, and describe some of the tools used to measure environmental impacts, such as soil and greenhouse gas metrics. Please contact us if there are specific subject areas that you would be interested in.

Reference Materials:

FFRC Report FFCC_Farming-for-Change_January21-FINAL.pdf

FAO 10 elements of agroecology Home | Agroecology Knowledge Hub | Food and Agriculture Organization of the United Nations (fao.org)

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