Livestock Health & Greenhouse Gases workshop, Tuesday 17th Nov 2020

Introduction

Endemic production-limiting disease is a major constraint on efficient livestock production, both here and across the world. Reducing the burden of endemic disease should help improve the biological efficiency of livestock production and help contribute to reducing the Carbon footprint of animal agriculture.

A virtual workshop was held via MS Teams on Tuesday, 17th Nov, 2020, with key representatives from the livestock industry, the veterinary profession, the research community and Scottish Government policy teams, Programme below:

Session 1 13.30 – 15.00 – Chaired by Julie Fitzpatrick	
13.30 – 13.35	Welcome and introductions
13.35 – 14.00	**Plenary Session** – a series of short overview presentations to set the scene (5 min., 2 slides max,) • Livestock Health Scotland, Independent Inquiry Farming 1.5C, NetZero2045 – Nigel Miller • ADAS/DEFRA Cattle Health & GHG Report, knowledge gaps – John Elliott • CxC Livestock Health & GHG Report, ongoing research – Michael MacLeod • Global Research Alliance on Agricultural Greenhouse Gases – Richard Dewhurst • Diseases & syndromes, break-out group instructions – Philip Skuce
14.00 – 14.30	Plenary discussion – an opportunity to ask questions of the presenters or to add comments pertaining to the areas highlighted by the presentations
Break 14.30 – 14.45	
Session 2 Break-out Groups 14.45 – 15.45	**Chaired by Facilitators – Colin Mason, Doug Bell & Hilary Burgess**
Participants assigned to either Dairy, Beef or Sheep breakout session	Three parallel workshop sessions. Participants are asked to consider and prioritise, for their sector: • The control or eradication of diseases which have been identified as eroding production/carbon efficiency and have widespread impact.

	• The risk phases in ruminant production systems which determine the value of KP Indicators and allow the design of targeted disease management packages to negate the risks and lift system performance **i) Cattle - Dairy** Facilitator – Colin Mason Scribe – Penny Middleton **ii) Cattle - Beef** Facilitator – Doug Bell Scribe – Keesje Avis **iii) Sheep** Facilitator – Hilary Burgess Scribe – Beth Wells
Session 3 15.45 – 16.30	**Chaired by Charlie Adam**
	• Workshop report back by the Scribes – Penny Middleton, Keesje Avis & Beth Wells • Plenary discussion - All • Identification of next steps – Nigel Miller • Meeting close and thanks – Ian Duncan-Millar

The aim of the afternoon was to discuss and agree **priority livestock diseases and syndromes** across the cattle & sheep sectors in Scotland, and to identify **packages of practical interventions** to help us reduce GHG emissions by 10% or more, to help the industry move towards NetZero2045. There hasn't been much empirical research in this area, but available information is summarised in the two published reports, below:

http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=17791

https://www.climatexchange.org.uk/media/2031/livestock_health_and_ghg.pdf

The priority diseases are relatively straightforward, however, the 'syndromes' require a little more explanation! Syndromes represent the health risk milestones across the three ruminant sectors (dairy/beef/sheep), and are crudely defined as conditions which share similar clinical symptoms and occur during a defined phase of production, [e.g. BRD: Bovine respiratory disease] or disease entities which may have diverse impacts or aetiology but occur at the same stage in the production cycle, [e.g. neonatal disease/mortality]. Identifying the critical disease impact points in any system can open the door to targeted health intervention to lift performance, raise Key Performance Indicators (KPIs) and reduce the carbon cost of production. The challenge is to identify the key syndromes which determine the overall performance of a production system. To identify where targeted health intervention can support system performance and

reduce GHG emissions. This strategy may be complex, requiring in some cases a package of interventions, but it may have the potential to deliver more significant gains than a single disease focus.

In advance of the workshop, we circulated sheep and cattle 'grids' to capture invitees' initial thoughts on priority diseases and syndromes across the three sectors viz. dairy, beef and sheep. Priority diseases and syndromes were scored and formed the starting point for discussions in the respective break-out sessions.

Cattle & Sheep Grid Summaries (based on 13 returns)

Dairy Cattle

- Disease priorities: Johne's>Mastitis etc.>Virus pneumonia>Lameness>IBR=Neospora
- Syndromes: Reproductive performance>Mastitis etc.>Involuntary culling

Beef cattle

- Disease priorities: Johne's>BVD>Virus pneumonia>IBR>calf scour/septicaemia
- Syndromes: Reproductive performance>Neonatal mortality>Bovine Respiratory Disease

Upland Sheep

- Disease priorities: PGE>Liver fluke>OPA>Sheep scab=footrot>Johne's

Lowland sheep

- Disease priorities: PGE>Footrot>EAE Chlamydia>Maedi visna>Johne's
- Syndromes: Neonatal mortality>Reproductive performance=Sub-optimal performance at grass

Notes from the Dairy Break-out group [Facilitator, Colin Mason; Scribe & Rapporteur, Penny Middleton]

- Syndromes were considered more important than individual diseases, broader actions to tackle syndromes and the 'pathogen soup' possibly having greater benefits that focus on single disease.
- From the list of syndromes sub optimal performance at grass was considered of lesser importance, but infectious lameness needed to be on the list as a significant loss but also being a causal factor for other syndromes such as mastitis and reproductive failures.
- Johnes and BVD were the only individual diseases warranting their own focus.
- Neonatal calf syndromes and loss were critical as thought to be very significant factors in efficiency loss – also coming under the calf heading is efficiency gains from strong calves going into the beef sector, increased use of sexed semen and better genetics to optimize beef production from the dairy herd.
- Genetics was identified as having a role to play, much focus for genetic improvement is based on production efficiency but we need to understand the significance of the role genetic resistance in efficiency, which may be harder to measure.
- Loss through parasitic disease is probably underestimated, the impact of sub-clinical loss and the increased susceptibility to other infections and syndromes caused by parasitic infection is important.
- Data is critical, it is important to identify where the biggest carbon efficiency losses occur is it through sub optimal reproduction, premature culling, inefficiency in growth/production caused by subclinical infection. If we have this information, we can use data collected through milk buyers and farm records to identify where the biggest gains can be made on individual farms.
- Dairy don't have subsidy incentives, so the focus needs to be efficiency gains to get environmental gains.
- Most change in dairy herds is driven through the milk buyers, assurance schemes and retailers so they are key – they also hold a lot of data that can be used to help identify where improvements can be made.
- Overall a 'high Health', holistic approach is needed, looking at getting an overall healthy herd founded on good genetics, vaccinations and biosecurity with targeted programs to drive improvements at individual farm level.

Notes from the Beef Break-out Group. [Facilitator, Doug Bell; Scribe & Rapporteur, Keesje Avis]

General agreement that both syndromes and diseases need to be looked at as there are many connections between the two. Also need to look at system-level performance including the spectrum of disease pressures, the impacts of nutrition, environment and genetics rather than just focusing on specific disease issues

Agreement that Johne's is a major problem but also very difficult to tackle. Lack of knowledge on what outcomes will make the biggest impact. Some called for concentrating on a couple of key areas rather than trying to do everything at once.

Some consensus to look at what causes adult deaths and death or lack of life at birth i.e. fertility and neonatal mortality. Many connections to forage and subsequent colostrum quality. Call for forage analysis across the board.

Comment that existing tools are not being used e.g forage analysis above but also vaccines.

All were keen for another meeting on this topic to feed into the QMS Beef Strategy. I would also suggest it could feed into the RESAS plan under their animal health section.

Research needed:

- Don't know what has the most impact. Need to focus on what will give biggest results
- Capture data from animals that don't get to abattoirs. What are animals dying from on-farm?
- Is the show ring producing what is needed on the farm?

Intervention Strategies

- Create a forum to look at this in more depth before QMS Beef 2030 strategy finalised, but with the understanding that every individual will have an idea of what is important on his/her own farm. Need to then provide an industry level steer.
- Use more vaccines. Will this be easier to do reflecting current greater awareness of importance of vaccines?
- test for more things using one sample

Notes from the Sheep Break-out Group. [Facilitator, Hilary Burgess; Scribe & Rapporteur, Beth Wells]

Priority diseases and syndromes

High priority diseases

Johnes, OPA, EAE, Toxoplasmosis, PGE, Sheep scab, Infectious Lameness (CODD and footrot)

Low ground – MV and mastitis

Upland – liver fluke

Low priority diseases

CLA, Listeriosis, Joint ill, Fly strike

Emerging

OPA, EAE, Liver fluke

Vaccinations available

EAE, Toxo, Pasteurella, Footrot

Syndromes – use to package diseases together to target control

Disease control/eradication strategies required to deliver the 10% GHG reduction target

What interventions/control strategies to counter the key diseases and syndromes?

a) **Reproductive performance**: EAE, Toxo

Improve uptake of reproductive vaccines:

Combined vaccine could be a practical way to improve vaccine uptake and affordability. This would also help with manufacturer take up for commercialisation.

Premium for vaccinated sheep: Financial benefits for EAE free flocks and non-accredited lambs could be sold vaccinated

Customised programme of vaccination for individual farms

Better handling facilities

Higher efficacy vaccines – such as for EAE where breakthrough abortions occur

Increased communication: Existing cooperatives / Farmer clubs for reduction in GHG emissions from livestock – bottom up engagement

Body condition is massive driver of reproductive performance and currently condition scoring is not widely / well used

Research required:

Affordable, combined vaccines (e.g. EAE and Toxo) and Improved EAE vaccines

b**) Longevity of breeding stock** – package diseases such as MV, OPA, Johnes and mastitis

MV – reduce stocking densities; de-stock and re-stock

Buying from monitored flocks – accreditation too expensive and often not practical

Increased biosecurity and quarantine in particular – timing wrong for this e.g. if tup sales were earlier in the year, quarantine would be more practical

Sample sheep monitoring

Research required:

Better data on disease prevalence for Iceberg and better diagnostics urgently required for OPA

c) **Sub optimal performance at grass**

Uptake of monitoring tools for PGE very poor

Knowledge of individual farm anthelmintic resistance is poor – annual FECRT on each farm

Quarantine anthelmintic treatment – uptake lower than should be - quarantine drenching packs should be made available for low numbers e.g. tups

Move to system were lamb challenge is lower to make a difference – use of grazing management to reduce lamb challenge. Reduce use of anthelmintics and reduce challenge

Holistic approach to mineral and vitamin status / soil testing

Research required:

Information on rotational grazing and roundworm burdens

Roundworm vaccines – pan-species technically challenging

The whole Workshop, including 2 x Plenaries and 3 x Break-out Groups, has been recorded on MS Teams, link below:

https://moredungroup-my.sharepoint.com/:f:/g/personal/blair_simmons_pentlands_co_uk/EjHM75j9OKJPueA2M4wMLOcBBoclTrTbKezqH3NOHI2w4A?e=F0VJJN

The challenge ahead

The eradication of a single disease or the implementation of a national control programme for a single disease [which may be a blend of flocks and herds with disease-free status and flocks and herds with defined control measures and/or vaccination in place] is likely to be more easily quantified and validated as it involves the total population and sets mandatory management standards. The outputs of the breakout sessions at this stage suggest that bovine Johne's,[perhaps IBR and Neospora] and EAE might fit into this category.

If a new form of national control through vaccination was adopted, both EAE and Toxoplasma vaccination might deliver an efficiency gain and in the cattle sector [beef/dairy], the mandatory use of vaccines to control viral pneumonia in young-stock would fit with group outputs and deliver efficiency gains.

The importance when focusing on syndromes of mapping out well defined intervention packages which are widely applicable across the sector or an option of two or more packages that have an efficiency equivalence to allow producers to adopt the most valuable package to fit flock or herd performance. The end point is not just to deliver system efficiency but a high level of uptake across the national flock or herd [of one package or one of a group of package options] which delivers a quantifiable efficiency gain which might be expressed in CO_2 eqv per kg /production or quantifiable reduction of emissions.

A viable disease/syndrome control strategy to deliver quantifiable gains in carbon efficiency across each sector as the key challenge in phase two.

Next steps

It was clear, across the board, that attendees would have liked and needed more time to work through the various disease and syndrome priorities to come up with a package of practical intervention strategies on the day. It is very gratifying that attendees wanted this to be the start of a process, rather than a one-off event, so we intend to reconvene the respective dairy/beef/sheep working groups, most likely in the New Year, with a view to reporting back to the Plenary meeting in due course. We received important feedback that certain groups, especially dairy, would have benefitted from more input from farmers, so that is something we will look to rectify. Also, some key individuals were unable to attend on the day and there may be others who could add significant value that we should invite to the next round of meetings, so please contact us with any nominations.

Thank you again for your participation, to be continued…

Rgds, Philip, Julie & Nigel

Attending Y/N		Name	Affiliation/interest	Breakout Cattle Dairy	Breakout Cattle Beef	Breakout Sheep
y	S	Nigel Miller	LHS, Independent Farming 1.5C, RAHWG			1
y	D	Julie Fitzpatrick	Moredun, SEFARI DEC	1		
Y	S	Ian Duncan-Miller	Moredun, farmer			1
n	D	George Caldow	SAC Consulting, LHS			
	S	George Milne	Farmer, LHS			1
y	S	Philip Skuce	Moredun, SEFARI Gateway, AH&GHGs			1
	D	Donald Armour	Vet, dairy farmer	1		
Y	D	Colin Mason	Vet, SRUC, dairy	1		
y	S	Kath Dun	Vet, sheep			1
Y	S	Ed Hill	Vet, sheep			1
Y	B	Michael MacLeod	SRUC, livestock GHGs		1	
n	B	Dom Mellor	Univ. Glasgow, EPIC			
Y	B	Robert Fleming	Beef farmer, LHS, Jim Walker Group, 1.5C		1	
y	S	Hilary Burgess	Vet, farmer, Shetland, LHS			1
Y	B	Andrew Barbour	Farmer, forester, deer, 1.5C		1	
Y	B	Charlie Adam	NFUS, LHS		1	
y	B	Steven Thomson	SRUC, SEFARI Gateway, rural economy		1	
Y	D	Nia Ball	SG RESAS Science Advisor	1		
Plenary only	B	Kirsten Beddows	SG Climate Change, Ag & Env Policy Lead			
	D	Derek Wilson	SG Climate Change, Ag & Env Policy Team	1		
Y	B	Alistair Prior	SG Livestock Production Policy		1	
N	D	Nick Ambrose	SG AH&W, LHS			
	B	George Gunn	SRUC, Epidemiology		1	
y	D	Susan Duthie	Biobest	1		
Y	S	Alasdair Nisbet	Moredun, Head of Diagnostics & Vaccines			1
y	B	Tom McNeilly	Moredun, Head of Disease Control		1	
Y	B	Dave Bartley	Moredun, Parasitology, CxC Report		1	
y	D	Craig Watkins	Moredun, Johne's research	1		
Y	B	Kate Rowell	QMS Chair		1	
Y	B	Douglas Bell	QMS Director of Engagement		1	
N	D	Sheila Voas	Chief Veterinary Officer			
n	D	Martyn Blissitt	Scottish Government			
Y	S	John Cameron	Farmer. LHS			1
	s	John Cameron	Another e-mail contact			
y	D	John Smith	Dairy farmer, NFUS, Climate Change Inquiry	1		
y	B	Gavin Hill	SAC Consulting		1	
Y	B	Basil Lowman	SAC Consulting		1	
n	S	Poppy Frater	SAC Consulting			
y	B	Keesje Avis	Farming 1.5C Commission		1	
y	D	Penny Middleton	NFUS	1		
Y	B	John Elliott	ADAS, DEFRA AC0120 Report		1	
n	D	Adrian Williams	Cranfield, DEFRA AC0120 Report			
Y	D	Nick Jonsson	Univ. Glasgow, Harbro Ltd.	1		
y	D	Richard Dewhurst	SRUC, GRA Agricultural GHGs	1		
Y	S	Beth Wells	Moredun Comms			1
	B	Neil Shand	Beef Association		1	
y	S	Davy McCracken	SRUC H&MRC			1
y	S	Ian Gill	NADIS			1
Y	D	Jenny Purcell	SG AH&W, BVD Eradication Scheme	1		
Y	D	Annabel Henderson	SG AH&W	1		
n	S	Alastair Douglas	SG AH&W			
n	S	Vivienne MacKinnon	SG Vet Advisor			
Y	B	Jenna Bowen	SRUC Researcher		1	
Y	B	Gemma Miller	SRUC, SEFARI-NFUS Fellow		1	
Y	B	Rebecca Audsley	SAC Consulting, FFBC		1	
Y	B	Neil Henderson	SG, CAP Pillar 2		1	
Y	S	Rhea Kyriazopoulou	SRUC Researcher			1
Y	S	Freda Scott-Park	Vet, NFUS Climate Change Advisory Panel			1
Y	B	Martin Kennedy	Vice President, NFUS		1	
N	D	Ruth Taylor	NFUS Climate Change Policy Officer			
N	D	John Armour	NFUS Livestock Policy Officer			
y	B	Robert Anderson	Merlin Vets		1	
Y	S	Lorna Dawson	James Hutton Institute & SEFARI Gateway			1
Y	B	Ian Murdoch	SG RESAS Science Advisor		1	
y	B	Kairn MacLeod	SG, Agricultural Officer		1	
y	S	Lucy Sugden	SG			1
y	D	Kim Gallacher	SG	1		
				14	**24**	**16**