AHDB Beef and Lamb Cull Ewes Project: Final Report

Ben Strugnell 20th December 2016

1. Introduction/ Background

Premature involuntary culling of ewes is a major cost to the UK sheep industry. Ill thrift is a major cause of involuntary culling, others being lameness, subfertility and mastitis. Studies show that many of the causes of premature culling of ewes as a result of poor condition are slowly progressive, incurable diseases with a long incubation period and may collectively be called 'Iceberg diseases, because the clinical cases seen on farm represent only a small proportion of all the sheep likely to be incubating these diseases subclinically. Such diseases include Maedi-Visna (MV), Johnes disease and Ovine Pulmonary Adenocarcinoma (OPA). All are difficult to diagnose in the live sheep but gross and laboratory diagnostic methods are acceptably accurate. Previous studies undertaken by AHDB Beef and Lamb (Lovatt and Strugnell (2013), Strugnell 2015, AHBD 2015, 2016) and VIDA data both agree that iceberg diseases represent a major cause of both mortality and premature culling in ewes.
Cull ewes can be difficult accurately to trace to slaughter because they tend to be sold live at marts. They are bought by dealers, who amalgamate large groups and transport them to for slaughter or fattening. It can be difficult to trace such ewes after sale and equally difficult to collect viscera from them when they are slaughtered.
The aim of this project was identify farms where ill thrift was identified as a major contributor to premature ewe culling, and target cull ewes from those farms to identify the possible reasons for the ill thrift. The cull ewes were followed to an abattoir where relevant samples were collected for gross examination and further laboratory testing.

2. Materials and Methods

In October 2015 a flier (Appendix A) was distributed among veterinary practices advertising the project and urging any farmers with cull ewes to contact the lead researcher (BS) for this project, to arrange for ewes which were due to be culled for ill thrift to be slaughtered at an abattoir to which BS had easy access and at which it was agreed that he could visit on the day the ewes were slaughtered to collect the following from each cull ewe:

- The head
- A clotted blood sample at sticking
- The pluck including liver
- The Gastrointestinal Tract.

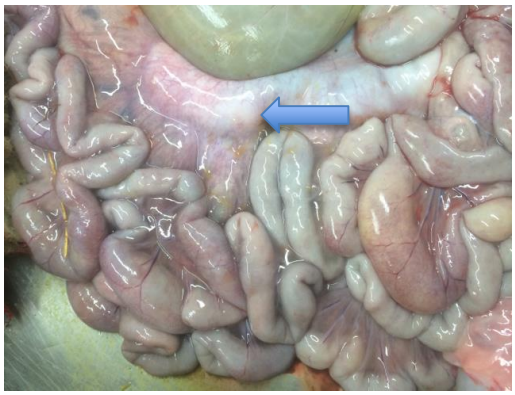
The viscera were examined grossly either at the abattoir or in a post mortem room and further confirmatory samples were taken at the discretion of BS. In almost all cases, MV serology and a pooled PCR for Johnes disease on faeces were performed. Other tests (serology for other diseases, histopathology, liver trace element testing, worm egg count testing and Johnes serology) were performed in

some cases based on the clinical presentation, gross findings and other farm circumstances. In all cases a report was generated and sent to the farmer submitting the ewes and his veterinary surgeon. The farmer received £20 per ewe irrespective of whether the ewes were condemned at meat inspection.

2.1. Justification of Disease Detection Protocols

Disease	Detection Method	Notes
Fluke	Gross Pathology alone	Self-explanatory
Poor Dentition		
Lung Abscessation		
OPA	Gross Pathology & Histopathology	Suspect OPA lesions were confirmed histologically during this project
Maedi Visna	Serology and lung histopathology of positives	MV antibodies can take a long time post-infection to develop. Histopathology was used to try to provide extra evidence of 'active' infection to incentivise action. Udder and nervous tissue could also have been histologically evaluated but this would have proved difficult.
Johnes Disease	Initial screen using pooled faecal PCR. Individual serology/ histopathology if lesions were florid.	Johnes disease may be paucibacillary or multibacillary (Clarke 1997, Clarke and Little 1996). Pathognomonic florid lesions with yellow intestinal discolouration and thickening are seen with the latter but gross findings in the former can be very mild. The PCR screen was therefore the first step, particularly so that cases of paucibacillary Johnes were not missed. Serology was used in some florid cases, as it is a cheaper way to confirm infection. This avoided 'contaminating' a pool comprising animals without gross lesions, with likely positive faeces. Faeces can be pooled in pools of 5 (APHA) or 10 (SAC). Culture was generally not used in this project due to cost and time taken for a result. This may have reduced sensitivity in some cases. A positive pooled PCR means that at least one animal is positive (shedding MAP). In some cases it would have been beneficial to do individual PCRs but this was prohibitively expensive. In some cases individual serology was used to attempt to identify infected individuals, but this test is insensitive (*i.e.* can miss positive animals). Using the pooled faecal PCR is a good way to establish farm status but less useful in determining prevalence of infection. It was intended that further on-farm testing initiated by this project, be performed to establish the latter.

Table 1. Brief description of diagnostic methods used during this project, with justification of the approach.



Figures 1 & 2. Photos of classic multibacillary (left) and paucibacillary (right; arrow: enlarged lymph nodes) Johnes disease in sheep.

3. Results

Between August 2015 and December 2016 a total of 111 ewes were examined in 18 separate submissions from 16 different farms. Numbers of ewes per submission ranged from 1 to 16, with a mean of 6.

3.1. Ewe Statistics

A carcase weight was recorded for 59/111 ewes (53%). Carcase weights ranged from 10.8 Kg to 22 Kg. Where a price was paid per kg, this ranged from £1.10 to £1.40. In other cases, a price was paid per head (£20-£30). The approach taken was dependant on the abattoir policy. Carcase value ranged from £0 (condemned) to £30. 20 of 111 (18%) ewes were condemned for emaciation.

3.2. Financial Considerations

On Average, each ewe was worth **£16.52**, meaning that the project made a loss of **£3.48** on each ewe as the value realised did not cover the £20 paid to the farmer. On top of this were killing costs, which varied from £0 - £15/ head (mean £7.70) depending on the abattoir used. Where the material was transported to the post mortem room for further examination, disposal costs of £5/ head (mean £2.30) were incurred for the material.
Overall therefore, a loss of (£3.48 + £7.70 + £2.3) **£13.48** per ewe was made, taking into account these costs. In this case the further diagnostic tests were covered by the project and on average, totalled around **£16.70/ ewe**.

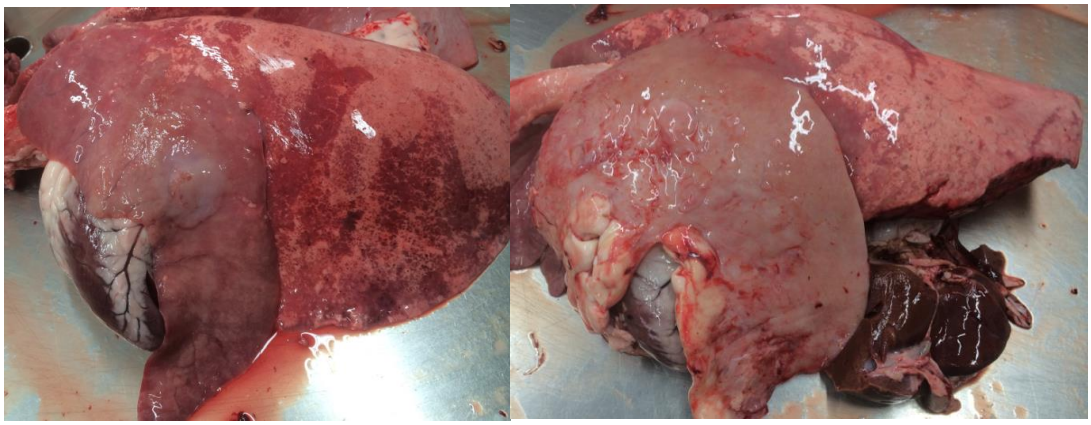
If total costs (£13.48 + 16.70 = £30.18) are offset against carcase value £16.52), a shortfall of £13.66 is left.

I would suggest that there ewes should be seen by farmers as the best chance to screen flocks for iceberg diseases, rather than a source of income, especially as their value is likely to be low. A case can therefore to be made to use the value of these ewes to pay for testing done on them, to inform flock health and establish status for important diseases, which will impact on productivity. I think that testing decisions could be made on the basis of known flock health status, which could reduce the diagnostic costs for a batch of ewes culled for ill thrift. In this project for example, the farmer would on average have to pay £13.66 to obtain the testing results gained, but this could be reduced based on current disease concerns within the flock. It is also possible that a farmer could obtain a better price for these ewes than the project did, thus reducing costs further.

3.3. Individual Results for all farms and action taken following the results.

Farm 1 (3 ewes submitted)
A 400 ewe swaledale flock whose main enterprise was breeding mules for sale as breeding females. Around 30 ewes were bred pure every year; the rest were tupped with a Bluefaced Leicester. There was a known problem with OPA in the flock and these were submitted as suspects. OPA was confirmed grossly and histologically in all three sheep.
Action Taken*: All ewes underwent thoracic ultrasound scanning and further suspect cases were identified and subsequently confirmed on post mortem*

examination. The plan is to undertake 6/9-monthly thoracic ultrasonography to identify affected ewes, and cull them. Breeding records are good and attempts will be made not to retain purebred offspring of known affected ewes, and not to sell breeding mule gimmers out of ewes with confirmed disease.



Figures 3 & 4: Gross lesions of OPA in ewes from flock 1.:

Farm 2 (17 ewes submitted)
A 700 ewe commercial flock comprising bought-in mules and some home-bred Texel X ewes, producing fat lambs for sale. Two batches of ill thrifty cull ewes were submitted: one batch of 7 and a second batch of 10. Of the first batch 2/7 were seropositive for MV. In the second batch, 1/10 was seropositive. There were gross lung lesions (moderate consolidation) in the seropositive ewes, which were sent for histological evaluation. In the first seropositive ewes, histopathology was equivocal; in the seropositive individual from the second batch histopathology was strongly suggestive of active MV infection. Testing for Johnes disease was negative; there was no gross evidence of fluke or OPA in any ewe. There were some tooth lesions to account for ill thrift in some ewes
***Action Taken*:** *The flock was depopulated as a result of the MV serology, to eradicate this insidious disease. A flock of MV-accredited lleyn ewes was bought in and contact between the two flocks was avoided. The aim is now to run a self-replacing recorded lleyn flock (and to routinely send ill thrifty cull ewes under future schemes if they exist).*

Farms 3, 4 & 5
These were small flocks with individual thin ewes which were sent to slaughter and samples collected. One farm sent two ewes and two sent one each. Johnes disease was confirmed (as suspected) on all three holdings and further Johnes disease monitoring is ongoing. It is difficult to assess the extent of the problem with such small numbers of ewes; in future a minimum of 4 is suggested.

Flock 6 (4 ewes submitted)
Hill flock of 1100 swaledale ewes evenly split between two flocks, one bred pure and the other bred to a Leicester to produce mule gimmers as breeding females. Ewes were very thin, some of low parity. MV serology was negative, pooled Johnes faecal PCR was negative, no evidence of fluke. There were some ewes with poor dentition. There were lung lesions confirmed as atypical pneumonia in one ewe but they were considered opportunistic.

***Action Taken**: No iceberg diseases could be detected. Advice was given to investigate PGE, trace element status and Border Disease in the flock (both outside the scope of this project). Poor nutrition could not be discounted.*

Flock 7 (6 ewes submitted)
A Hill flock of 800 swaledales, producing pure replacements and mule gimmers for sale as breeding females. Fluke was suspected as the reason for ill thrift in what were older ewes. No gross findings in any ewe (no gross evidence of fluke) with the exception of moderate jejunal thickening which histologically was suggestive of parasitic gastroenteritis. One pooled faecal PCR for Johnes was positive; the other was negative. All MV serology was negative.
***Action Taken:** The worming policy was reviewed. The flock is positive for Johnes disease but the prevalence may be low and the financial impact may not be major. Continued monitoring for Johnes in thin ewes was suggested.*

Flock 8 (11 ewes submitted: one batch of 3 and one of 8 (submission 15)
A 1000 ewe swaledale hill flock of which 700 ewes are bred to a Leicester to produce mule gimmer lambs for sale as breeding females. Johnes disease was suspected grossly in the first 3 ewes but this was not confirmed by PCR. There were no other lesions in these ewes. In the second batch, there were florid gross lesions of Johnes disease and both pools were positive by PCR. 2/7 ewes were weakly seropositive for MV but lung histopathology did not suggest active infection. Lung abscessation in 2 ewes.
***Action Taken**: Vaccination for Johnes disease in the ewes is contemplated. Ongoing monitoring for MV is initiated (10 thin older ewes to be blood samples 6-9 monthly). Johnes is likely to be the major cause of ewe ill thrift on this farm. Needle hygiene was also reviewed owing to the lung abscessation.*

Flock 10 (10 ewes submitted)
An 850 ewe swaledale flock; half bred pure and half to the Leicester. 10 ewes in very poor condition submitted, some 1- and 2-shear ewes. No gross findings in any ewe except *Trichuris* worms in the colon. One of 2 faecal pools was PCR positive for Johnes disease; all bloods seronegative for MV. Trace element assays of livers showed two ewes marginally deficient in copper; selenium levels were adequate. A pooled worm egg count was moderate at 450 epg.
***Action Taken:** These results were equivocal. The high incidence of very thin ewes of low parities prompted a review of (especially nutritional) management of these ewes in their first winter, with consideration to be given to moving them to rented lowland pastures. Some degree of Johnes disease but prevalence uncertain and more investigation required.*

Flock 11 (3 ewes submitted)
A 600 ewe performance recorded hill flock comprising 50% swaledales and 50% lleyns which were recently bought-in. An ill-thrift problem in the lleyn ewes was identified and three 3 /4- crop ewes submitted. All were seronegative for MV. One had terrible cheek teeth. The other two had advanced gross lesions of Johnes disease (photo below) and the pooled PCR was positive.
***Action Taken:** The priority is to eradicate Johnes disease from the lleyn flock where it is likely to be a major cause of ill thrift. Ewes will be screened by pooled Johnes PCR and flock replacements will not be bred from animals in a positive pool. Continued monitoring to assess progress will also be required.*

Figure 5. Gross lesions of Johnes from a ewe in flock 11.

Flock 12 (16 ewes submitted)
A 1200 ewe swaledale hill flock breeding mule gimmers for sale and some lower parity swaledale ewes are bred pure. 16 mainly older ewes were submitted. Fluke and poor dentition were suspected causes of the poor condition. Two pools of 5 faeces were screened using the PCR- both were negative. 10/16 ewes were seronegative for MV. No gross evidence of fluke. Several ewes with severe tooth lesions and poorly-chewed long-fibre ruminal contents.
Action Taken*: No evidence of any iceberg disease found; tooth lesions were the only reason identified for the ill thrift. These findings could be used to give confidence of buyers of breeding mule gimmers from this farm, that the health status is good (on this evidence).*

Flock 13 (15 ewes submitted)
A 1000 ewe swaledale flock with a suspected problem of OPA. Some lung lesions found at slaughter (the farm vet did the gross post mortem examination in this case) but all were histologically characterised as verminous pneumonia. 10/15 ewes were seronegative for MV. One of two pools of 5 was PCR positive for Johnes disease.
Action Taken*: Further investigation of ill thrifty ewes required to assess the prevalence and economic impact of Johnes disease. No evidence of OPA found*

Flock 14 (6 ewes submitted)
2000 ewe closed organic lleyn flock. Some ill-thrifty ewes identified of lower parities. All ewes were seronegative for MV and pooled faecal PCR was negative for Johnes disease. The striking gross findings comprised multifocal severe chronic lung and parotid abscessation in 5/ 6 ewes. There was also some gross evidence of atypical pneumonia
Action Taken*: Needle hygiene and injection policy was reviewed. Ewes were screened for selenium status (ewes are fed unsupplemented home-mixed hard feed prior to lambing). Interestingly, atypical pneumonia was also found in some fat lambs and gimmer flock replacements; investigations into the extent of Mycoplasma ovipneumoniae (which could conceivably cause lung abscessation through chronic airway damage) are ongoing.*



Figures 6 & 7. Gross appearance of chronic abscessation in lungs from ewes in flock 15.

Flock 16 (4 ewes submitted)
A large mixed-breed flock which has recently expanded and is considering closing the flock to live females. Four ill-thrifty older ewes were identified. All were seronegative for MV with no gross fluke lesions. There was poor dentition in one and florid gross Johnes disease in another. That ewe was seropositive for Johnes and a pooled faecal PCR in the others was also positive.
Action Taken*: Johnes disease is likely to be the major cause of ill thrift but the financial impact should be established before any major interventions are contemplated.*

Flock 17 (4 ewes submitted)
A 350 ewe flock comprising pure white-faced woodland ewes and crosses. All were seronegative for MV. A light fluke infestation was seen grossly (the farm was unaware). Some atypical pneumonia. All ewes had tooth lesions sufficient to account for ill thrift. The pooled faecal PCR for Johnes disease was positive but there were no gross lesions and all ewes were seronegative using the Johnes Ab ELSA.
Action Taken*: Further diagnostic testing for fluke was suggested. Further screening for Johnes disease was indicated.*

Flock 18 (8 ewes submitted)
1000 ewe hill flock selling some breeding females. All seronegative for MV. A large lung abscess in one ewe. Gross findings suggestive of Johnes disease- histologically confirmed. Poor dentition in several ewes.
Action Taken: *The flock is positive for Johnes disease but the prevalence is likely to be low. Needle hygiene was reviewed.*

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3.4. Summary Data for all farms

Table 1 shows a breakdown of the disease status of each farm for each disease under consideration, as determined by the results of testing of carcase samples collected at slaughter. A positive status was assigned if at least one animal from the batch tested positive to any disease by any test.

Farm	Submission	Johnes	MV	OPA	Lung Abscessation
1	1	-	-	POSITIVE	Negative
2	2	Negative	POSITIVE	Negative	Negative
	3				
3	4	POSITIVE	Negative	Negative	Negative
4	5	POSITIVE	Negative	Negative	Negative
5	6	POSITIVE	Negative	Negative	Negative
6	7	Negative	Negative	Negative	Negative
7	8	POSITIVE	Negative	Negative	Negative
8	9	POSITIVE	POSITIVE	Negative	POSITIVE
	15				
9	10	POSITIVE	Negative	Negative	Negative
10	11	POSITIVE	Negative	Negative	Negative
11	12	Negative	Negative	Negative	Negative
12	13	POSITIVE	Negative	Negative	Negative
13	14	Negative	Negative	Negative	POSITIVE
14	16	POSITIVE	Negative	Negative	Negative
15	17	POSITIVE	Negative	Negative	Negative
16	18	POSITIVE	Negative	Negative	POSITIVE
Totals (Pos/ Total)		11/15* 73%	2/15* 13%	1/16 6%	3/16 19%

Table 2. Summary of disease status for all farms included in this study, for each of 4 diseases. (Farm 1 not screened for Johnes or MV)

4. Discussion

4.1. Johnes Disease

Johnes disease was by far the commonest disease identified during this project, with 11 of 15 farms tested being of positive status. On the face of it, this is a serious finding for the industry. However, the fact that Johnes disease is present on a farm may or may not mean that it will be making a large contribution to farm efficiency and profitability, and that further investigations or interventions are necessarily justified. It is possible that on some farms, Johnes disease causes severe ill-thrift in a small number of individuals and the scope for these to infect others is limited. Further work is much-needed to establish the significance of the infection on these farms.

One can however gain an impression from the combination of findings presented here. For example, in flocks 8, 11 & 14 (see table 3), gross lesions were seen and all tests performed for Johnes disease were positive, suggesting a significant prevalence on-farm.

Farm	Ewe	(Pooled) Johnes Faecal PCR	Gross Pathology	Johnes Serology	Histopathology
3	1	POSITIVE	++	-	-
4	1	POSITIVE	+	-	-
5	1	POSITIVE	-	-	
	2		-	-	
7	1	POSITIVE	+	Positive	
	2		+	Negative	Lymphoplasmacytic enteritis only (parasitic)
	3		-	Negative	
	4	Negative	-	-	-
	5		-	-	-
	6		-	-	-
8.1	1	Negative	+	-	-
	2		+	-	-
	3		-	-	-
8.2	1	POSITIVE	-	-	-
	2		+	-	-
	3		-	-	-
	4		-	-	-
	5	POSITIVE	++	-	-
	6		-	-	-
	7		-	-	-
	8		+++	-	-
9	1	Negative	-	-	-
	2		-	-	-
	3		-	-	-
	4		-	-	-
	5		-	-	-
	6	POSITIVE	-	-	-
	7		-	-	-
	8		-	-	-
	9		-	-	-
	10		-	-	-
10	1	POSITIVE	+	-	-
	2		+++	-	-
	3		+++	-	-
12	2	POSITIVE	-	-	-
	3		-	-	-
	4		-	-	-
	5		-	-	-
	6		-	-	-
	9	Negative	-	-	-
	10		-	-	-
	11		-	-	-
	13		-	-	-
	15		-	-	-
14	1	POSITIVE	-	-	-
	2		-	-	-
	3		-	-	-
	4	-	+++	Positive	-
15	1	POSITIVE	-	-	-
	2		-	-	-
	3		-	-	-
	4		-	-	-
16	1	Negative	-	-	-
	2		-	-	-
	3		-	-	-
	4	Negative	-	-	-
	5		-	-	-
	6		-	-	-
	7		-	-	-
	8	-	+++	-	POSITIVE

Table 3. Breakdown of patterns of Johnes disease testing in individual ewes on farms classified as positive for Johnes disease.

In contrast, on farms 7, 12 and 9, one pooled faeces sample was positive for Johnes, while the other was not. It was not financially possible to establish the

exact proportion of individual sheep shedding MAP for these flocks, but it can be said with certainty that half of them were not. Further work would be required to assess the impact of disease on-farm. This result was unexpected; the expectation had been that if Johnes was 'active', then almost all ill-thrifty ewes would be infected. It is however, perhaps to be expected, given that many of these farms are extensive hill farms, where opportunities for the sort of close contact which may be expected to lead to Johnes dissemination via the faeco-oral route, typically from older clinical ewes shedding large numbers of organisms and (susceptible) lambs, may be limited.
The significance of the PCR positive result in flock 15, where there were no gross lesions consistent with Johnes disease, may also be questionable, but certainly warrants further within-flock investigation.
Testing for Johnes disease is hampered by the long incubation period, at the beginning of which shedding may be hard to detect even by PCR, the cost of the PCR (£30), which is prohibitive for commercial flocks on an individual ewe basis, and the fact that the cheaper antibody assay may not become positive until late in the disease if at all.
Given these difficulties and the findings of this project, there is a need for real longitudinal (probably a least 5-year) on-farm case studies to try to establish:

-Cost-effective ways of determining on-farm prevalence
- The value of interventions in reducing disease transmission. These may include hard culling of thin ewes (likely to be shedding), changes in sheep flows (e.g. minimising vertical transmission at lambing), age-stratification of flocks and vaccination.
- True costs of disease on flocks with high, moderate and low disease prevalences.

4.2. MV

MV appears to be uncommon as a recognised clinical disease in the North East of England but seropositive ewes were found during this study in two of 15 farms. It was unexpected on both farms. These farms were classified as positive and one (based on anecdotal and published reports of the cost of this insidious disease) decided to depopulate, and it is likely that this decision will be vindicated by subsequent flock performance. It is probably present on a minority of flocks in this region, though and its impact on performance is probably even more difficult to assess than that of Johnes disease. Overall, it may be reasonable to consider it of lower priority based on the findings of this report.

4.3. OPA

Ovine Pulmonary Carcinoma was found on one farm, where there had been previous cases, and where the disease was suspected a the cause of the ill thrift in the submitted ewes. It is interesting to note that the prevalence of OPA in cull ewes in a recent abattoir study was 0.9% (Cousens *et al.* 2015), whereas the prevalence in ewes submitted to a fallen stock collection centre in North East England in another study was 5.6% (Lovatt and Strugnell 2013), the latter prevalence having been confirmed by further post mortem examinations at the same site b y the author (AHDB 2015 and 2016). Thus it may be the case that OPA is more likely to be found in *dead* ewes (usually the *coup de gras* is opportunistic Pasteurella pneumonia), whereas the prevalence of Johnes disease may be higher in *cull* ewes (as this project suggests).

4.4. Lung Abscessation

Chronic Suppurative Pneumonia, or lung abscessation, has been identified in previous studies as one of the most important causes of death in adult ewes (Lovatt and Strugnell 2013, AHDB 2015, 2016), and it was interesting to find it in high prevalence on one farm in this study, and at a lower prevalence in another two. In the most severely affected farm, no other cause of ill thrift was identified, making this the main disease on which to concentrate- a clear and unequivocal message. There is much scope for better application of best practice with respect to needle hygiene throughout the industry; these findings underline this fact once again.

5. Conclusions

In conclusion, this project has achieved its aim of proving the principle that:

1. With some effort, ewes can be followed to slaughter and samples obtained from individual ewes to determine flock status for important production-limiting diseases
2. The value of even quite ill-thrifty ewes can be offset against this testing, to reduce costs.
3. This could provide a good initial screen especially for Johnes disease, which may be of interest to buyers of breeding females.

6. Implications and Suggestions for further work

Local abattoir screening of ewes identified by farmers as likely to be representative of an identified on-farm problem of ill-thrift could form part of national efforts to improve flock productivity. In particular work in the following areas is suggested:

- Training and enabling veterinarians (OVs) already working at abattoirs to perform this sampling when requested on identified batches will reduce costs as these vets are there *already*. This would reduce the travel and time costs of other vets (e.g. the farmer's own private vet)- which could be prohibitive (waiting at abattoirs for a batch to be slaughtered can be time-consuming!)
- There is an urgent need to evaluate costs attributable to Johnes disease on infected flocks
- There is an urgent need for longitudinal on-farm case studies to conclusively demonstrate the effectiveness or otherwise of interventions to minimise the impact of major iceberg diseases, especially Johnes disease.

7. References

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8. Appendices

Appendix A: Cull Ewes Project Flier

Have you got too many thin ewes?

If so you may be interested in a scheme in the North of England

The scheme will buy your cull ewes for £20 a head. After slaughter, their organs will be examined by a vet to look for causes of ill thrift. Laboratory confirmation is included so you can be sure of any conclusions.

You will receive a report detailing the findings, to use with your vet as part of the flock health plan.

You should chose ewes which are thin without a good reason, *e.g.* not lame, not having been dragged down by lambs, good incisor teeth. Ewes can be submitted in batches of 5-20 and should be fit for human consumption (i.e. out or drug withdrawal periods)

Please contact Ben Strugnell in the first place for more details, on 07899950372 or email ben@farmpostmortems.co.uk for more details

Appendix 2: Cull Ewes Project Example Report

AHDB BEEF & LAMB

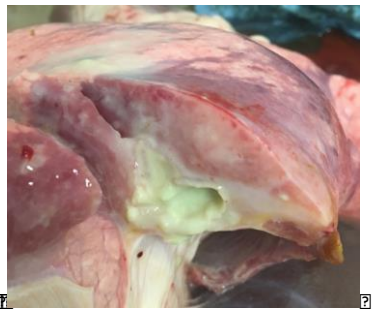
FPM FARM POST MORTEMS LTD

Cull Ewe Report: Flock B (Kill Date x.x.x.)

Description of Enterprise	Brief Clinical Summary
1000 ewe flock comprising mainly Swaledales of which half are bred pure and half go to the Leicester to produce mule gimmers	Too many ill thrifty sheep.

Ear Tag	Breed	Age	Gross Findings		Laboratory Findings**		
					MV Serology	Histopath	Johnes PCR
Xx	Swaledale	BM	Teeth, GIT, liver	NSL	Negative	-	POSITIVE
			Lungs	NSL			
Xx		FM	Teeth, GIT, liver	NSL	Weak Positive		
			Lungs	NSL			
Xx		BM	Teeth, GIT, liver	NSL	Weak Positive	Abscessation and interstitial pneumonia only	
			Lungs	Focal Abscess/ Fibrosis caudal lobes			
X		BM	Teeth, GIT, liver	NSL	Negative	-	POSITIVE
			Lungs	NSL			
xx		BM	Teeth, GIT, liver	Step Mouth	Negative		
			Lungs	Mild caudal lobe fibrosis			
Xx		FM	Teeth, GIT, liver	Missing maxillary molar	Negative		
			Lungs	NSL			
Xx		4T	Teeth, GIT, liver	Thickened Yellow jejunum	Negative		
			Lungs	NSL			
xx		BM	Teeth, GIT, liver	NSL	Negative		
				NSL			
			Lungs	NSL			

**APHA xx-S0xxx-xx-xx. Results of further testing for these ewes



Comment: The gross findings, particularly in 00748, and the positive Johnes PCR for both pools, suggests that **Johnes disease** is the most significant factor contributing to poor condition in ewes on this flock. Two weak positives for MV but no convincing histopathological evidence of active infection (in lungs). The flock is probably positive but prevalence is probably low at this time.