JOHNE'S INITIATIVE

A ROAD TO FREEDOM

A Johne's Disease Initiative

Workshop

March 1st & 2nd, 2005, Strand Palace Hotel, London

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Workshop Programme

Venue: Strand Palace Hotel
372 Strand, London, WC2R 0JJ

Day one - Tuesday, March 1st, 2005

10.00am	Registration and Coffee	
11.00am	Introduction and the aims of the workshop	Keith Redpath, NBA
11.15am	Affirmation of the partnership	Charles Milne, CVO SEERAD
11.30am	The UK perspective	George Caldow, SAC
12.00pm	A breed society initiative	Bruce Lawson, Welsh Black Cattle Society
12.30pm	Johne's Vaccine Developments	Ms Jacquenine Vialard, France
1.00pm	Lunch	
1.30pm	A Global Perspective	David Kennedy, Australia
2.30pm	Breakout discussion groups	
	a) What information do farmers need on Johne's disease? (Leaflet)	Keith Cutler / R Anderson
	b) What activities are needed to tackle Johnes disease & what is the role of Breed societies.	David Leggat / D Thomlinson
	c) How do we convince farmers that there is a need to control Johne's? What are the benefits?	Tim Brigstocke / D Sinclair

Each group will report back to the main session after discussions by providing a summary to the above three questions. Discussion sessions should conclude at approximately 3.30pm

3.30pm	Coffee	
3.45-4.45	Plenary session of group discussions.	
4.45pm	Speaker Panel Q & A	Keith Redpath
8.00pm	Dinner	

Day Two - Wednesday, March 2nd, 2005.

9.00am	What is needed to achieve national control of a non-notifiable disease	Peter Franken, EU Animal Health Service, Netherlands
9.30am	Summary and conclusions from breakout groups 1) What information do farmers need on Johne's disease? 2) What activities are needed to tackle Johne's disease and what role can the breed societies take? 3) How do we convince farmers that there is a need to control Johne's?	Group Chairmen
10.30am	Themes and Possibilities	Bill Parish AHW Division DEFRA
11.00am	Coffee	
11.15am	Summary of workshop outcomes and next steps.	R Forster, Chief Executive, NBA
12.15pm	End of Workshop	Keith Redpath
12.30pm	Lunch	

I. Introduction

W. Keith Redpath (Chairman)

A warm welcome was extended to all the delegates attending the workshop, together with the speakers who had come from afar afield as Australia, France and The Netherlands. The aims of the workshop were to learn about the disease from those with experience, how it behaves and the types and success of control programmes already established in other countries. Following the presentations the delegates would debate the issues relevant to the UK industry(ies) and develop a way forward.

II. Background and Preparation

Partnership in Cattle Health Disease Issues - Dr. Bill Parish (DEFRA)

Dr. Parish also welcomed the delegates and thanked Keith for his organisation of the workshop. The recently announced Animal Health and Welfare Strategy (AHWS) outlined by government is a partnership, and the key message was that the best disease control results would always come from industry and government working together on the basis that prevention is always better than cure - especially if everyone recognised their responsibilities and appreciated that disease was an avoidable cost.

He explained that his role was to progress farm health planning within the stakeholder working group format and to sell the benefits of the strategy using industry champions. The stakeholder format is broken into sector specific groups, which assess what health planning means for their sector, taking into consideration costs and problems. Specific problems are also addressed, for example endo-parasites in sheep and the production of the SCOPS information document for sheep farmers. DEFRA's role is to facilitate meetings, guide discussion with industry representatives, develop and introduce information leaflets, and also fund these initiatives.

It soon became clear that the first disease the cattle sector group wished to tackle was Johne's Disease, which surprised DEFRA because they recognise that it could possibly be the most difficult of all the major bovine diseases to control.

This workshop is the first step in facilitating a forward strategy for the industry. Its only expectations are to allow a frank exchange of views under Chatham House rules to determine whether we can tackle Johne's Disease and to assess the level of commitment to this. It will be important to manage expectations and keep a realistic approach regarding what can be achieved in a given time.

DEFRA acknowledge that they have a lot to learn regarding communicating with farmers and stakeholders in order to develop solutions together. However, partnership-building will be about learning to appreciate each others' ways of working, listening to the views of others, being patient

with each other, and approaching problems from the "public good" perspective.

The draft information leaflet has been drawn up from within the stakeholder group under the guidance of Keith Cutler of the BCVA, and he hoped that both the leaflet and the speakers would provoke two days of constructive dialogue.

III. Summaries of Professional Contributions

Where are we in the UK and what lessons can be learned from the global experience?

George Caldow - SAC, Bush Estate, Edinburgh

It is commonly assumed that Johne's Disease is the most complicated disease to tackle, with no substantiated indication of prevalence. The disease presents as a chronic enteritis with loss of body condition; is caused by myco bacterium avium paratuberculosis (MAP). Estimates suggest that in 2000 there were 1000 cases rising to 2400 cases in 2004 - possibly as a result of increasing herd size. Increased awareness of the disease may also be influencing this figure. This may mean somewhere between 20% and 50% of herds are affected, however Denmark has estimated their herd prevalence at 55%.

It was noted from an earlier study that two per cent of supermarket milk samples contain MAP and that the Food Standards Agency does not currently consider beef to be implicated in the pathogenesis of Crohns Disease.

There are three reasons why Johne's disease has an important impact on farms:

a) There is significant financial loss in infected herds because it significantly reduces production output
b) There are public health concerns, albeit unproven
c) There are welfare concerns for the animals affected

Factors that affect the spread of disease are:

a) buying in replacements from infected herds
b) increased herd size and stocking density
c) more intensive production systems
d) feeding waste milk to calves
e) Pooling of colostrum
f) cow hygiene
g) rearing own replacements within infected herds
h) contaminated water for drinking
i) wildlife reservoirs
j) the organism can remain viable in the environment for long periods of time
k) manure infected with the organism maybe distributed onto land subsequently used for grazing

It is suggested that for industry to have a positive effect on this disease it must be tackled in the beef and dairy herds simultaneously, because of the cross-over of breeding stock. Estimates of dairy production loss are approximately £2600 per 100 cow herd; however international estimates are much higher. One of the reasons for this loss is that infected cows rarely reach their average life expectancy of 9 years and infected bulls rarely reach 4 years of age. There is a long incubation period and diagnostic tests are unreliable, animals may transiently appear to recover clinically and they may be infected at any time in their life. Blood antibody levels may fluctuate and this may make it difficult to test herds. All of these factors make it a confusing disease to treat based on our lack of knowledge.

GC gave a brief description of Crohns noting that it was an ulcerative bowel condition that showed some pathological similarity with Johne's Disease and that MAP had been recovered from some cases.

Studies have shown that other wildlife may have an impact on the spread and potential eradication of Johne's Disease because they can pick up the disease and spread it in faeces onto grazing fields. The MAP organism has been found in milk, blood, and faeces and it does cross the placenta, to cause congenital infection in calves. Many experts use the Iceberg concept, which stipulates that for every animal showing clinical signs there will be another 7-10 excreting and another 7-10 incubating the disease. However, experts do not have a consensus of opinion on the size of the iceberg effect. This scepticism is fuelled by the fact that only 1/3 of these cases are identified in diagnostic tests. Overall, diagnostic testing has low sensitivity. The ELISA serology test, which detects antibody in blood is acknowledged to have a sensitivity of up to 90% for clinical cases but this drops dramatically when testing infected animals that are clinically normal and shedding low numbers of organisms. In these cases the sensitivity may be only 15%. *Faecal culture* is quoted as having a sensitivity of 45% but it is a time-consuming and protracted method which can take up to three months to provide a result. There is also the problem that up to 20% of cultures may be lost due to contamination. The Polymerase Chain Reaction (PCR) test detect *Mycobacterium avium paratuberculosis* (MAP's nucleic acid) and is a very sensitive test but at the moment is not available to test faeces, but has been used to test milk with the refinement of a concentrating process (IMS). It may well be that PCR testing will be the test of choice for the future.

In practical terms, Mr Caldow suggests that it is not possible to screen individual animals at the point of sale with any certainty. Industry approaches to control must start with advice on bio-security and cattle hygiene to reduce the risk of transmission of infection within a herd.

The scheme operated by SAC is illustrated in the appendix. A robust programme needs to identify herds free from infection, carry out periodic testing to confirm that freedom and have a certified health programme. For herds identified as infected there must exist a testing system and advice on management to reduce new infections and identify infected animals for removal. A herd progresses through a testing regime so that herd status can be improved. 5% of Accredited Herds lose their status due to breakdown, from various sources, but mainly through adult infection. UK experience indicates that confidence in the scheme is low because the interpretation of results is difficult; there are fluctuations in the levels of antibody present, there is little data to use as evidence, and if adult cattle can pick up the disease then how can we have confidence in breeding replacements.

Bottom line however is that if an animal gives a positive test result it should be culled. Progress is made rapidly in a few herds only, reaching eradication stage relatively quickly. Effective reduction in clinical disease and a reduction of percentage test positives are made in the majority, however progress is slow in those herds where the initial incidence of infection is high. The challenge lies in reducing the levels of Johne's Disease by reducing the spread, and thus increasing the confidence in breeding replacements which are free of infection.

Vaccination as a method of control was mentioned and it is used effectively in some Dutch herds. However, it was felt that overall it was not beneficial because vaccinated animals still excreted the organism, vaccine may interfere with interpretation of the TB test, and finally it was a live vaccine which produced serious reactions if inadvertently injected into the operator or helper.

The control of this disease is a serious challenge for the beef industry. There are a number of factors:

Measures taken may prevent or reduce spread of disease. This will reduce the financial losses caused by Johne's disease; control will increase confidence in the health status of breeding replacements that are purchased; and data must be collected about the disease to support decision making.

The challenges facing the veterinary profession are:
- To produce monitoring and accreditation programmes that work.
- Deliver best advice on biosecurity and hygiene in relation to Johne's disease for the individual producer.

Questions / Answers

- Testing more frequently does help the rate at which cases are identified. A single herd test can expect to detect between 15 to 30% of positives, while repeat runs will usually identify 90% of animals before they become clinical. Success is measured by a reduction in clinical cases and then a reduction in test positives.
- It is usually five years before the result of a test and cull policy become apparent and the test cost is (approx) $6.60 per cow per annum.
- There does seem to be a stress period when animals will have higher antibody levels, for example prior to calving and during the period of work for bulls.
- Studies have shown a link with wildlife, particularly rabbits, so rabbit control is a measure which will reduce the cycle of infection.
- Johne's can be species adapted in cattle and sheep, but it doesn't build up to the same level in sheep.
- There does not seem to be a clear breed pattern emerging for beef breeds, however it is generally thought that breed may play a part, because the Holstein has shown a heritable tendency.
- Young bulls seem to be particularly at risk because they necessarily move into new herds at an age when diagnostic tests are not sensitive. Further, traditionally bulls lose body condition rapidly once they go into the new herd, and may be at risk from adult infection.
- Testing younger cattle has very variable results.
- Vaccinated cattle should be tested anytime after 3 years of age.

Bruce Lawson - Veterinary Consultant to Welsh Black Cattle Society

What can we learn from the Welsh Black project?

The Welsh Black initiative to control Johne's disease began in 2000, through breed development funding supplied under European 5b funding. Johne's Disease was present in the breed prior to the mid 60's, albeit at a low incidence. The introduction of larger buildings, greater intensity of production and a move to autumn and early spring calving where young susceptible calves are housed, brought an increase in the within herd prevalence of the disease, which was spread through the breed by the sale of infected breeding replacements.

The programme was originally created to create awareness and understanding of the disease and to develop as many herds as possible certified free of the disease using the PCHS to do so. It was hoped that achieving these objectives would increase the value and numbers of pedigree stock traded, resulting in an overall increase in popularity of the breed. The accreditation scheme states that a herd will be certified as "monitored free" if it passes its first two annual blood tests free of the disease. If infection is already present, then the herd must achieve three clear annual tests in order to gain this status.

After 5 years, the programme has 216 members of which 71 are "monitored free", 62 have had one or more clear herd tests and there are 71 herds still infected. The biggest problem in the worst affected herds, is that they are unable, for economic reasons, to cull effectively or they have poor hygiene or inadequate bio-security. The success of the programme is dependent on a critical mass of herds participating, which is encouraged through promotion, funding, adapting pedigree sale rules to encourage participation, and controlling health declarations in sale catalogues, again to encourage but also to prevent the use of misleading information. Sales consistently have now over 50% of entries from herds certified monitored free or with one clear herd test. The most recent average is around 65 per cent. The commitment at farmer level is consistent, even though the funding has been only partial and temporary. Indeed, only 4 of the initial 60 who have now been participating for over 5 years, have dropped out and all of these have been for reasons of changed farming policy. Those herds which are heavily infected receive a "hygiene" visit from a vet to advise on management changes which should reduce the spread of infection within the herd. Further, the positive results are discussed with the farmer and a plan of action agreed. Of those already certified clear, 4 have broken down in subsequent herd tests. It is important that participating farmers understand the interpretation of test results.

The problems identified include the low sensitivity of the ELISA test and the length of time the faecal culture test takes. The Welsh Black experiment suggests that the Iceberg effect is less than at first suspected, and that it is not possible to interpolate results for dairy herds in the USA to the UK beef industry. The biggest reason that herds opt not to participate in the scheme, is that of fear of the results together with the subsequent actions required and the stigmatism of status, rather than any cost factors.

The benefits, from a breed point of view, are that the image of the breed has been enhanced, those breeders achieving highest status have increased returns for their stock; understanding and awareness

of the disease has increased; biosecurity measures are enforced and an ever increasing reservoir of clean replacement stock is being developed. Indeed, of the total number forward at the last bull sale, 60% of those sold were from herds which were either "Certified" or "Clear Herd Test" status. Increases have also been seen in numbers of females sold, the average price and overall registrations. It is the opinion of the speaker that all the original objectives have already been met.

Price advantages from accredited herds were obvious. The average of about £3,500 for bulls from accredited herds compared with around £1,800 for bulls from unaccredited herds was a clear indication that positive action is starting to produce good financial results.

Questions / Answers / Observations

- Funding has been in two parts, but has been targeted at the breed society and restricted to Wales. It has taken the form of £4 per cow tested which equates to the cost of the lab fees only. The breed society paid for the promotional work and the farmer paid for the veterinary portion.
- There is an upper limit to the funding, at 100 animals (per herd).
- It would seem that farmers would not stop testing or membership of the scheme if the funding ceased, because funding has only been for 1 or 2 years and the earlier members have always continued their membership despite no further funding.
- It is difficult to quantify how many active breeding members have not joined, but it is estimated that membership includes over half of these. Of those who don't or won't join, some sell only commercial cattle and as yet see little benefit and others are afraid to join, preferring not to know their status.
- The rules state that as long as an animal is sold within the rules of a clean herd, then any subsequent positive test is not the responsibility of the vendor.
- The critical mass in numbers is also difficult to quantify, but surely must be the stage where the scheme is self promoting, when vendors are reluctant to supply for sales animals that don't have a health declaration.
- Not many faeces samples are taken at sales, but people see that some are taken, which is all that is necessary to maintain awareness.
- Most cattle are sold at less than two years old, so an individual blood test is of little use.
- It is hoped that demand for commercial Welsh Black cattle will return as a result of this initiative.
- In Bruce's experience only very few veterinary practices have been proactive in encouraging their pedigree clients to participate in the scheme.
- It has not been possible to work out any genetic link or familial trait within the breed.
- Enforced bio-security measures have also increased the awareness of other diseases, for example BVD.
- Herd size is an important factor in achieving accredited status, those with smaller herds tend to reach it quicker.
- Membership of the scheme insists upon slaughtering positive test cases. However it is not a requirement for offspring to be culled, although it is recommended that the previous two calves are culled.
- There has never been a challenge to the rules, probably because the rules have the backing of council and are made for the benefit of the breed and individual breeders.

Jacquemine Vialard - Professor of Infectious Pathology, National Veterinary School of Lyon, France

Vaccination control of PTB - the French experience

The French PTB control programme was initiated in 1985, because it was considered that in the areas to the North and West of Lyon herds were heavily infected. The local farmers proposed adherence to a voluntary control programme, funded by their local co-operative. The control programme in France is voluntary in both membership and monitoring. The incidence of the disease is estimated to be high in a number of areas, and there is economic discrimination for those herds that are infected. The introducing of hygiene measures to combat infection is part of the certification programme, and is broadly similar to other countries. Economic help is provided for testing and a reasonable value culled animals through the farmers' co-operatives.

Infection occurs principally, by ingestion of feed such as colostrum, milk or grass which is contaminated by faeces. Once the bacteria are in the intestines, they are captured by specific cells (called macrophages). Gut lesions and thickening of the mucosa develop slowly and are responsible for the clinical signs such as diarrhoea and weight loss. Infected macrophages can migrate by blood and come back to the gut, inducing the development of new lesions. Occasionally, in this way, the fœtus can also be infected. Bacteria are eliminated in the faeces that subsequently contaminate the animal environment, feed and water. Bovines are generally infected during the first month of life, when they are most at risk. After a long incubation period, often several years, clinical signs occur between 4 -5 years of age, often after parturition. Clinical disease has been observed in animals as young as 10 to 12 months, but only in herds with a high rate of infection and poor management practices.

Two events can be noted during the development of disease, the emergence of antibodies in the blood of infected animals, and the progressive presence of bacteria in faeces, up to several million bacteria per unit. Antibodies and bacteria in the faeces can be detected by diagnostic tests (serology and faecal culture), when their quantities rise to a certain level. In summary, three periods can be described :

- A long period of infection without excretion and without seropositivity
- A period without clinical signs but sometimes excretion and/or seropositivity
- A terminal stage with clinical signs, high excretion of bacteria and seropositivity

Vaccination has been used as a control mechanism in the French monitoring programme, and to be effective, vaccines must decrease the impact of the disease; decrease weight and productivity loss, decrease infertility and susceptibility to other diseases. Further, it must prevent infection and allow those which do become infected to be detected accurately.

There exist both live and dead **vaccines**, and up to three strains in each vaccine. It is the French experience that animals should be immunised within the first week of life, and before being challenged by paratuberculosis (PTB) infection from the environment, for best protection. Further, repeat injections later in life fail to add to the protection offered by the first inoculation and may occasionally cause severe local reactions. The vaccine available in the UK is a live vaccine combining 3 strains. Vaccination can reduce the number of clinical cases, especially in heavily infected herds, and also decreases the level of bacteria shed in clinical cases. Several studies have noted a reduction in clinical cases in herds which previously had many. The advantage is that cows at this stage of the

disease don't have any economic value, and younger animals are not being infected. However, the studies also showed that the disease does not completely disappear. A study by Argente (France), which looked at the differences between vaccinated and non vaccinated animals in the same herds, concluded that, when submitted to the same herd management practices, non vaccinated animals were much more likely to exhibit the disease than vaccinated animals. The shedders were detected by faecal culture, when animals were two, three and four years old. Positive faecal culture animals were culled and modification of herd management practices were applied, (see figure 1) which demonstrates the percentage of shedders in both non vaccinated and vaccinated in the study. There are three conclusions to be made here:

• Comparison of the first faecal culture results between the two groups, shows that vaccination is an efficient protective measure and that a beneficial impact can be obtained very quickly. But after several years, the difference between vaccinated and non vaccinated cattle is no so marked, and crucially, the infection is still present in the herds.

• A significant decrease in the percentage of positive faecal culture (FC) in the first group is observed. These results prove the efficiency of hygiene measures and of detection and culling of excretors, with a significant decrease specially between the second and the third years. So you can reduce the number of PTB shedders only by hygiene measures but it takes longer than if vaccination was also used.

• For the second group of animals, results for the three cultures show no significant decrease. That confirms culturing of vaccinated cattle is not very useful because the level of excretion in these bovines is low, generally under the threshold of detection for the test. Currently, in France, faecal culture is not applied to vaccinated cattle and these animals cannot have the advantage of a certification program.

Effect of vaccination on mycobacterium paratuberculosis shedding (2)

Conditions of the study (Following during 3 years - Dairy cattle)

• Live vaccine (< 1 month old)

• Detection of shedders by faecal culture (> 2 years old)

Results of faecal culture (FC)	Group 1: Cattle born during control program and non vaccinated	Group 2: Cattle born during control program and vaccinated
1st Year	6,5% positive FC	1,2% positive FC
2nd Year	5,7% positive FC	1,7% positive FC
3rd Year	2,7% positive FC	0,7% positive FC

Argenté (1991)

Figure 1.

Jacquemine also gave us the benefit of her own experience with vaccine use, herds which have used vaccination methods for a long time. After several years without clinical cases and no positive faecal culture, farmers believed their herds were free of PTB. They stopped vaccination and generally four or five years later, new clinical cases were observed.

So why does vaccination not prevent or eliminate infection? Vaccines can limit the extension of infection resulting from re-infections but don't prevent infection by oral ingestion. Clinical cases are

more rare in vaccinated animals because gut lesions are not extensive but the bacteria are not eliminated and these animals are still infected and excrete bacteria. The protective effect of vaccination is more efficient when vaccination precedes exposure. It is very important to vaccinate animals as soon as possible but it is not always easy to apply, especially in extensive beef cattle. In spite of this, vaccination may have a role to play in a control program of PTB. The positive effects on clinical disease and bacteria excretion are very interesting in heavily infected herds, however vaccinated animals could never be considered to be free of paratuberculosis.

The negative effects of vaccination are threefold. An inflammatory swelling and subsequent nodule (4 to 5 cm) at the inoculation site has been observed. The oil adjuvant is responsible for this severe local inflammatory response which can persist for a long time (several years). For these reasons, animals should be inoculated at sites that can be easily trimmed at slaughter. Inoculation sites that can be easily injured must be avoided. Generally the injection is made in the brisket and precautions must be taken to ensure that the vaccine is administrated aseptically and strictly subcutaneously to minimize local reactions.

Of greater concern is the development following immunization of a strong and persistent sensitivity to avian and mammalian tuberculin, which interferes with diagnostic tests for bovine tuberculosis. This is due to common structural elements between m. bovis, m. avium and m. paratuberculosis. However, reactions to avian tuberculin are greater when compared with bovine tuberculin and TB reactors can be differentiated from vaccinates by comparative intradermal testing, but this differentiation test is expensive.

Thirdly, Muskins (2002) demonstrated that animals vaccinated with a killed vaccine showed antibodies rapidly after immunization. The percentage of ELISA positive cattle decrease with increasing age but a significant number of animals were still positive after 3 years. The same result has been observed with a live vaccine. Thus, there is a limited chance that vaccinated herds can participate successfully in a certification program based on serological screening of cattle, even those over 2 years old.

Can we hope for better vaccines in the future? The aim is to have tools which can prevent infection and allow the discrimination between infected and vaccinated animals. That means new vaccines but also will also mean development of new diagnostic tests. Several trials have been undertaken recently. Acellular vaccines prepared with secreted proteins are being investigated as well as new adjuvants and new administration routes. But no new vaccine, which fulfils the above criteria, is expected to be available for a long time.

David Kennedy - (AusVet Animal Health Services Pty Ltd., Orange, Australia)

Beef industries throughout the world are interested in Johne's Disease for several reasons, which include the following:

- Market access is dependant on disease status in some areas, and discrimination occurs in local markets where transparency and competition exist.
- There is a potential human health/consumer perception issue
- Product quality is an issue

• Animal Welfare is an issue
• Economic production losses and deaths
• Other countries are interested in the research and experience

Expert reviews have concluded that there has been no proven causal link between Johne's Disease in cattle and Crohns Disease in humans. The US National Academy of Sciences concluded in 2003 that

"There remains insufficient evidence to prove or disprove that *M paratuberculosis* is a cause of some or all cases of Crohn's disease in humans. A causal link between *M paratuberculosis* and Crohn's disease remains a plausible hypothesis that warrants a new research approach and steps by industry and government agencies to identify and mitigate avenues of exposure."

In Australia, experts are nominated to respond to media enquiry about the issue. Although there have been occasional stories in the Australian press, there appears to be an appreciation that the disease is very complex, and recognition that visible efforts by the industry to control Johne's will be helpful should a causal a link with Crohns ever be proven.

The risk of infection spreading and establishing in beef herds increases with movements and intensification in contaminated environments. The impact of this infection depends on the enterprise type, the market type (semen, export etc.) regional prevalence - competitors, ability to change management practices, and support mechanisms to tackle problem. Approaches to deal with Johne's disease at the herd level range from doing nothing to attempting to eradicate infection, and the methods that may be employed at a national level range from voluntary accreditation and control by farmers, through industry-driven programs to mandatory intervention at government level; making it a quarantinable disease.

As Johne's disease spreads slowly and has a long incubation and because the effectiveness of diagnostic tests and vaccines is limited, it takes time to make progress and demonstrate results. Developing an integrated approach that uses an effective combination of the available tools is likely to be most successful. Where vaccines are available, vaccination may be used as one component of an integrated control plan to reduce the level of clinical infection to a manageable level and reduce excretion of mycobacteria but should not be regarded as a silver bullet. Again, once established, Johne's disease is difficult and may be impossible to eradicate on a large scale, and only a little easier on a regional basis unless there is good access to clean breeding stock. Industry and peer support for farmers whose herds are infected is considered critical to encourage investigation of suspect disease and participation in any control programs. They should not be made to feel like lepers which only results in more of the disease being driven underground.

Many countries, particularly in western Europe and North America, have implemented or are in the process of developing national programs, many with suppression of infection rather than eradication as the goal. However, some countries including Sweden and Japan aim to eradicate the disease. The USA carried out surveillance work in 1997 to determine the herd prevalence within the beef industry, which has been estimated conservatively at 8%. Subsequently, they have established national standards for herd assurance programs and for State control programs. A national Johne's Disease Integrated Program of collaborative research has been initiated to undertake a large portfolio of research, including work on new diagnostics and vaccines. Demonstration herds are being used

to monitor control programs, what influences prevalence and which management controls work, for example. They have published a draft national strategic plan which basically aims to reduce prevalence and increase producer participation, increase education and monitoring of effectiveness. This includes an ambitious proposal to develop a plan for rapid eradication if a link with Crohn's should be proven. David Kennedy considers that government and industry should be very cautious in promoting national eradication as an option should a link be proven as, with current tools, it may not be possible to achieve and a more appropriate approach would be to take responsibility and be open with food agencies to manage Johne's disease and animal products so that human exposure to *M paratuberculosis* is minimized

Johne's disease is not uniformly distributed across the cattle industries in Australia, where the individual States are responsible for animal disease control. Johne's disease is very uncommon in the beef industry and is absent or uncommon even in dairy cattle in some parts of the country. Although most States have had their own control programs for some years, the first step in the national program in 1996 was to develop national standards for a voluntary herd certification program, or Market Assurance Program (MAPs), to allow low risk herds to demonstrate their test-negative status in a transparent manner. Subsequently, the official approach to control of known infection has been based, not so much on state boundaries, but on zones of infection, ranging from "free" to "residual". Western Australia is officially free of cattle type Johne's disease. In the low incidence (protected) zones, infected herds are quarantined and infection may be eradicated. In the control areas, where the incidence is higher, principally in the dairy industry, controls are put in place on infected premises. This may include movement restrictions, calf rearing and herd testing.

A new approach to Johne's disease in cattle was initiated in 2003 and aims to involve most cattle herds in preventing spread and managing infection rather than concentrating on the known infected herds and herds that have voluntarily tested for accreditation. The new National Approach recognizes that eradication is not feasible and has three goals:

1. Reduce contamination of farms & farm products by *M paratuberculosis*.
2. Protect the status of non-infected herds and regions.
3. Reduce the social, economic and trade impacts of BJD at herd, regional and national level.

It has been the experience of Australia that regulatory intervention unnecessarily restricted domestic trading of cattle, and so it has been the goal for some time to reduce this impact, while increasing consumer protection. In areas where disease is prevalent there are several levels of disease status ranging from MAP statuses, negatively tested, to known infected and not assessed. In the dairy industry a new national Johne's scoring scheme will allow each herd to be scored between 1-10 from known infected to top level in the MAP and herds in the free zone. Farmers can declare their herd score on the national vendor declaration form when selling breeding replacements. Crucially, it is proposed that non assessed herds are demoted to 0 in 2006 because their true status is not known and the industry wants to encourage them to become involved, becoming aware of their own status. To facilitate management of Johne's in the dairy industry, research is underway on a bulk milk herd test, especially aimed at identifying the heavily infected herds in which disease control will then be promoted.
A scoring system has also been implemented in the sheep industry where ovine Johne's disease is endemic, but not in the beef industry at this stage. Beef herds that have little or no contact with dairy

cattle are classified as a low risk status called *Beef Only*. This is based on a standard written and signed vendor declaration certifying that the herd complies with the criteria.

In Australia some of the messages to help protect a herd against buying infected stock include:
- buy from low risk types of herds with high scores
- buy as few animals as possible and from as few places as possible
- take particular care when sourcing bulls, and the more you have to lose the more careful you should be.

In establishing a workable voluntary risk assessment and declaration system, it is necessary to use the following guidelines:
- Assess risks and implement practical tools and management methods to reduce them
- keep the strategy simple - scoring for all herds works well
- keep the education level high among all sectors of the industry
- provide a supportive environment for those that are infected - financial assistance for testing and compensation for culls. This is essential to keep fear and discrimination at bay
- wherever possible standardize methods of testing and advice, especially across regional areas
- share information and learn from the mistakes of others.

Questions / Answers

- The organism is so difficult to eradicate because its identification through testing is not reliable, and there is a very long incubation between infection and clinical sign. David used the example of Bovine TB, another mycobacterial infection, to point out that the advances have been limited in diagnostics and vaccines. However, Australia has eradicated bovine TB.
- Involving non assessed herds presents a challenge, but the industry has means available to encourage or demand that all herds are tested. Better faecal testing of pools of cattle would also help (e.g. sheep are faecal cultured in pools of 50 in Australia).
- While it is true that the more animals introduced into the herd, the greater the risk of a problem, it is also true that keeping replacements from closed herds with an incidence of disease is also an equally great problem. The important thing is to know what the herd infection status is so appropriate control and protection can be implemented.
- Everyone has access to the scoring system results, if the farmer chooses to declare the score they are displayed on the vendor declaration form for sale animals.
- Australian studies have been unable to find a link between rabbits and infected cattle or sheep, thus it is estimated there is not a reservoir situation. There have been approximately 25 herds which had been monitored negative in the MAP in which an infected animal was subsequently detected, usually at herd test,
- It was noted that, in the UK, the self replacing herd was the biggest risk of having infection become endemic. The risk of within herd transmission is probably low in the most extensive herds but those herds that are in-wintered are at higher risk.

Dr. Peter Franken - Project Manager, Paratuberculosis Programme in the Netherlands,

What is needed to tackle a non-notifiable disease?

The answer to this question is Commitment and Funds!

The Dutch Dairy industry is very vulnerable because so much of its product is exported to Germany, thus food scares are a major issue. The Animal Health Service in Deventer centralises the Johne's Disease (JD) strategy which is overseeing all the parts of a diversified approach; research, communication, certification programme (free herds), control programme (infected herds) and para planner (JD management check). A steering committee, including industry membership, guides the management of the programme. Funding for research, co-ordination and communication is split between the government and the industry, while farmers pay for herd level control programmes.

The target for the programme is to improve the national JD situation because of the economic impact on production and the potential human health hazard. The main tool used is the Paraplanner programme aimed solely at increasing and forcing awareness of the elements of management that will reduce the risk of spreading the disease. The certification and control programmes reinforce the success of such measures. This approach has been taken because previous test and cull programmes have had little impact on the overall prevalence, while systematically introducing measures which increase bio-security predict a much better result (see figure 2). Management measures that influence the prevalence of the disease are as follows:

- Identify and eliminate the clinically infected animals
- Minimise cow calf transmission - separate the calf after birth to a clean environment
- Don't feed waste milk to calves, use milk replacer
- Only use colostrum from JD free cows
- Increase hygiene - clean water, don't drink from burns, keep well bedded, decrease access to slurry or soiled areas
- Testing programme to identify early disease signs
- Purchase animals only from certified herds

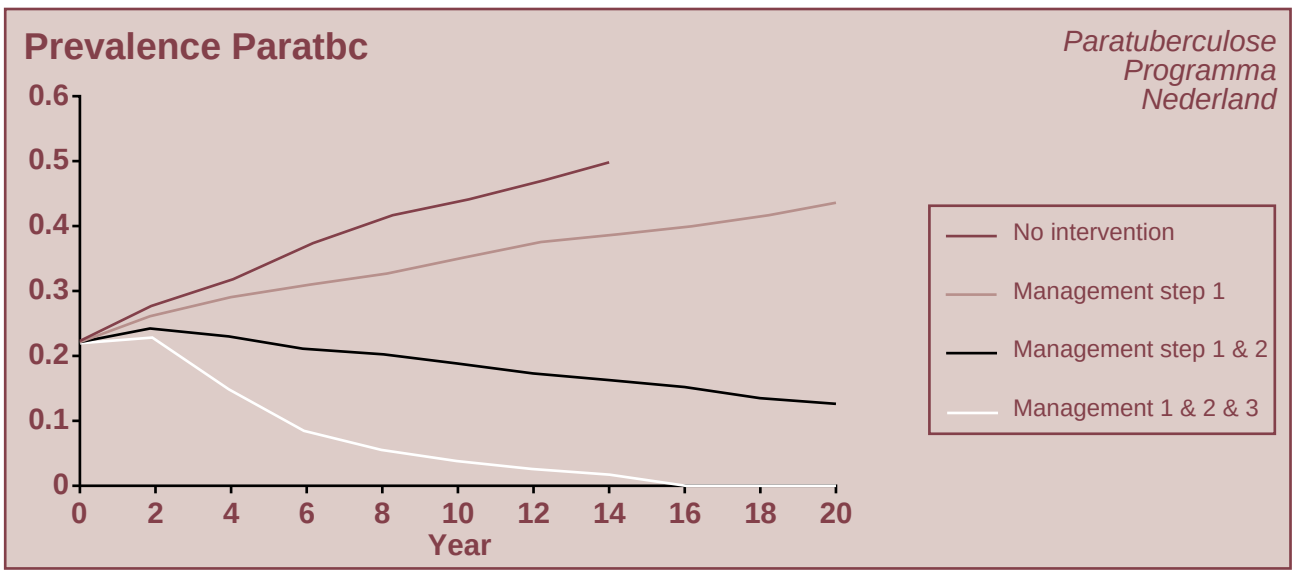

Figure 2. (Groenendaal c.s.)

In practice, the preventive measures are broken down into production stages; during parturition, rearing until weaning and post weaning. It is thought that the cow should be moved to a different and clean shed for calving, and in the dairy industry, prompt removal of the calf to its own clean environment. During rearing calves should be made to suckle their own mother exclusively, and if not, milk replacer should be used rather than waste milk. It is recommended that dairy calf housing be individual, with no contact with other adult animals. Water supplies should be clean at all times and of piped source. Feed should be made from clean forage and not fertilised with dung from infected animals or cut as aftermath from grazing with infected animals. After weaning it is advised that young stock are not grazed with adult animals, and graze on land free of manure with clean water supplies.

Model studies have shown that it is necessary to change the management behaviour to successfully decrease the infection rate to an acceptable level, and this will take at least one generation of cows. The results of a study on changes in management are due to be published this year and will be used to educate farmers of the importance of this tool. Practical results show that the implementation of the changes to management strategy are about 80%; especially when those measures deemed economically feasible are implemented. Closed herds are not the only answer because replacements could be kept which are also infected, without the ability to test at the time of choosing. However, open herds not implementing preventative measures will certainly see deterioration.

Other targets in the strategy include further research and implementation of feasibility studies. These have included transmission experiments, improvements in detection, changes to the certification programme and modelling intervention studies. Another development will be to shift the paraplanner programme to "prevention planner". As always the level of communication needs to be integrated further to include all levels of the industry, creating more awareness and inclusion for the benefit of the industry.

The challenges for the future lie with integrating preventative management measures into quality assurance programmes and to successfully manage JD at a low level rather than attempt eradication. Preventative management as performed by the farmer will be checked by the infection status of the herd. Improvements to the certification scheme will be based on risk assessment and cost / benefit.

Questions / Answers

- The prevalence in the national herd is about 30% of which approx 10% of the herds are high prevalence herds and another 20% have only a limited number of positive reactors
- The factors which are influencing the lack of success of the partnership approach in the past were:
- Subsidised testing or culling simply (partially) funded the result of ineffective management/behaviour, and some times it was even not coupled with a culling requirement.
- There was no management measures put in place on farms
- Funding is now planned to be awarded only after production of lower incidence rates; paid on results
- Overall, the farmer pays 100% of the operational costs of the programme.
- The farmer is allowed to choose the schedule for testing.
- JD is ranked by farmers as the 4th most important infectious disease in cattle in the Netherlands; BVD, IBR and Salmonella are ahead.
- Increasing herd size is a problem when tackling JD because of epidemiology constraints.

- The management steps referred to in the graph, 1,2 & 3 are the production stage measures implemented; up to calving, post calving and calf rearing.
- The Dutch programme and its measures in dairy can be applied to the UK but the management of suckler herds where calves stay with their mothers and with other adults will be more difficult.
- In literature there is some discussion about the survival of JD in pasteurised milk. Normal pasteurisation temperatures should inactivate JD.
- Both milk and blood are tested with the French ELISA test because of its high specificity combined with an acceptable sensitivity for the detection of high shedders.
- Some countries are asking for information on JD control programmes and for certified animals or products thereof, however as yet most don't.
- It was important to encourage farmers to voluntarily submit requests for testing.
- Would it be possible to engage the help within the UK of devolved meat industry organisations like Eblex (England) or LMC (Northern Ireland) to raise farmer knowledge about the advantages of Johne's control.
- It would be useful if the UK killed two birds with one stone and combined surveillance with control / eradication.

Debby Reynolds - CVO DEFRA, London

Debby Reynolds, the UK CVO addressed the delegates after previously making an important policy announcement regarding the future strategy for TB. She confirmed to the meeting that the government fully supported the initiative on Johne's Disease from both an agricultural production and a food safety perspective. The government is currently working on the regulations surrounding the OTM scheme withdrawal, and hopefully the opening up of exports. She reminded the delegates how important it was to keep traceability and quality of animals for slaughter at a high level.

TB is an immensely frustrating disease which is why the government has published a strategic framework today aiming to form a sustainable approach to decrease the incidence of the disease in hotspot areas, keeping the clean areas clean. This will include a balanced approach to the interaction of cattle and badgers. The results from the Irish project have been evaluated and will form part of the evidence base, but she was careful not to extrapolate the results into GB.

IV. Breakout Group Summaries

The delegates were divided into 6 groups and asked to give their views on the following topics after discussion:

Topic 1: What information do farmers need on Johne's disease? (leaflet)

Topic 2: What activities are needed to tackle Johne's disease and what is the role of breed societies?

Topic 3: How do we convince farmers that there is a need to control Johne's disease? What are the benefits?

Robert Anderson (Topic 1)

- Don't under estimate the seriousness of the disease, nor the resolution of the steering group resulting from this meeting in attempting to control this condition.
- It may be necessary to target those farmers with the most heavily infected herds first.
- It is necessary to quantify the incidence and the production losses in order to highlight the problem, without exaggeration.
- The leaflet explained the protocols very well.
- Need to address the Dairy industry with a join initiative.
- Need to address who and how to deliver the message - possibly pick out champions in certain sectors to deliver the message - geographical consultants?
- Whatever approach is decided, funding needs to be put in place to avoid landing the whole burden on farmers.
- Well informed large animal vets could take on initial control programmes as whole herd health planning for the government's health and welfare strategy provides the framework

Keith Cutler (Topic 1)

- Farmers need to be equipped with the tools of knowledge to understand the costs of doing nothing, costs of testing, prevalence of the disease within their own herd.
- Suspected clinical cases need to be tested, not simply culled, and their offspring as well.
- This information needs to be fed back into knowledge and education.
- The leaflet is good - informative and easy to understand, while not being alarmist.

David Thomlinson (Topic 2)

- What is the prevalence? Essential to know this level, so a national testing programme should be implemented. This could be done at the same time as TB or Brucellosis testing.
- Economic losses need to be demonstrated once a national prevalence has been established - min and max
- Standardisation of advice - educate producers
- Breed Societies can assist in education and administration process but they aren't professionals for advice.
- Commercial producers, both beef and dairy, need to be included in the equation as the interaction between the sectors is large.
- Milk processors can raise awareness on the health issues and encourage dairy herds to isolate young animals.
- Eradication programme should be embarked on (particularly in Pedigree Herds) - Vaccination in herds with high incidence, but this will be difficult in pedigree herds.
- Get rid of the OTM scheme and cows will be culled much quicker, decreasing the shedding level in herds.

David Leggat (Topic 2)

- Need to know the scale of the problem - overall incidence, which breeds and geographical areas are worst.
- Could use abattoir surveillance to do this.
- Need to raise awareness of the condition.
- The current PCHS is doing a good job, but need to encourage national campaigns.

- Auction network is useful to concentrate numbers of tested stock.
- Local vets could also do more to help their customers.
- Education is key to understanding the testing and what it means, as well as the level of production losses.
- Breed Societies need to take a uniform approach, control sale declarations, drive market assurance programmes, and integrate with dairy industries.
- Government needs to provide a funding package to achieve the goals set by the industry.

Duncan Sinclair (Topic 3)

- The perceived benefits of implementing a control program are low because of the stigma of the disease status becoming public knowledge and there are restrictions to trading.
- Big need to heighten awareness among farmers and vets to avoid the over stigmatisation - just normal disease prevention. Ideas for dissemination of information should come from stakeholders so that the message is simple and consistent.
- Production losses from an average unit should be included in the information available to farmers.
- Should not be made notifiable because we have heard that it has not helped the incidence of disease in NI.
- There is a need for a central information hub to be developed to act as a focal point for any queries on the disease and to ensure consistent messages and information are disseminated across the industry.

Tim Brigstocke (Topic 3)

- No real clear financial benefit has been demonstrated to encourage farmers to tackle the problem.
- No real advisory service in England, useful for disseminating information.
- Use the Welsh Black model as a forward strategy, as it is practical.
- Some monitoring of results would act as a driver.
- Dissemination of information is essential because there is little consistent information available, but difficult if farmers don't buy in.
- 40% of suckler cows come from the dairy industry and contributes to the problem.

V. Themes and Possibilities

The group chairmen, together with Bill Parish summarised the breakout group discussions into some topics for discussion.

Broadly it seems that for the purposes of managing this disease from an industry level, there are three distinct groups to target, and these will all need different strategies; Dairy, commercial and pedigree herds. It will be essential to integrate the Dairy industry into plans, as it is estimated that 40% of suckler females originate from within the Dairy herd. All three categories source bulls from the pedigree industry, at ages lower than reliable individual testing will allow, so the herd status will be the most important issue. Evidence from auctioneers suggests that the pedigree sector is most advanced in educational terms, and the commercial sector is learning rapidly. David Thomlinson estimates that 50% of commercial buyers are now asking for details on health status. Lucy Andrews, from Holstein UK, indicated their willingness to support any initiative and move together. Indeed, it would seem the most sensible option to co-ordinate a consistent approach across the livestock

industry, getting the message out to grass root producers using third party agents such as feed companies. The dairy industry has had a leaflet distributed already, which seems to have had little impact, however at a recent meeting, when the impact of Johne's on milk quality was explained, interest increased. Farmers will listen to a spoken message rather than reading literature.

Integrated approach or regionalised strategy? After very little discussion it was decided a joined-up approach to the overall message was essential, but we had to use the vehicles available in the devolved areas to drive the message, creating flexibility in strategy. A steering body with a balance of industry membership to co-ordinate the message and messengers, would be the way to go. John Carson reminded the meeting that he felt that NI might lose out on such an initiative because of its lack of devolved status. Robert Forster confirmed the need to find a solution to include NI and Eire, as there were a lot of cattle which cross the border. It was suggested that Cattle Health Certification Standards (CHeCS) could assume the role of industry co-ordinator. It was the feeling of the meeting that making JD notifiable, without a buyout scheme, would not be helpful for a variety of reasons. It was felt that farmers must be encouraged through the price mechanism and other influences to increase their awareness.

Discussion followed on the general enthusiasm of the veterinary profession to get involved with sampling and surveillance. Those present from the veterinary field felt that if an industry co-ordinated approach needed vets to up-skill, then the challenge would be taken up. There seemed broad agreement that using the chance to test when doing brucella testing would work. It seems there is general agreement that broadly, there are two types of veterinary surgeons, those selling vet services primarily and those making the bulk of their profit marketing drugs. It was suggested that vets committed to getting involved with the scheme should do a day course with CHeCS. Agreement would need to be made on the aims of the testing programme and the end use of the data, in order to know how to design the trial. An essential part of the strategy will be how to fund it. It was suggested that levy money, both from the dairy and beef industries could be diverted, match funded by DEFRA. Evidence from the rest of the world suggests that all schemes have been initially primed by public money.

An action plan needs to be formulated by the strategic body to identify both short and long term goals, prioritise the most important, achieving stakeholder engagement and ultimately delivering "whole farm animal health and hygiene". More specifically, the body needs to identify the following:

- the messages it wants to communicate
- champions for delivering the messages
- the methods of dissemination
- the correct membership for the steering group
- the longer term plans
- the piloting ideas
- the targets for training of professionals

VI. Conclusion and Summary

(Robert Forster, Chief Executive, NBA)

Control of Johne's could only be achieved if efforts were made on an all-UK basis. The disease did not recognise devolved administration boundaries and organisations like the NBA, RCVS, and the pedigree breed societies which could help Defra with its programme operated UK-wide too. It was also clear that any new Johne's campaign would have to be founded on a test and cull policy. A co-ordinating body to link industry with government would have to be formed and the foundations for this had been established through the Johne's steering group within the NBA's Cattle Health Committee which was made up of a range of industry groups and individuals who had helped to draft a Johne's information leaflet and organise the workshop. However, it would be necessary to expand and refine this group's membership to 12-15 capable individuals representative of both the UK, industry expertise, and industry interest groups so it became even more effective. It was currently attended by Keith Redpath (NBA UK), Keith Cutler (BCVA), David Thomlinson (LAA), Peter Rudman (NFU), John Carson (NBA Northern Ireland), Tim Brigstocke, (RABDF), DEFRA, MDC and HUK and during its next meeting on March 21st it was hoped to identify which other individuals and organisations should be added to the forum.

A pivotal part of the message to the industry were the benefits of identifying clean herds and although this could only be done if the infected herds were identified too, the industry should be made aware of the financial advantages to individual pedigree and commercial breeders if they could be certain they had reduced the risk of buying infected cattle and introducing them to their herd. It was hoped that pedigree societies would be especially alert to the advantages of identifying, and then cleaning up, herds within their breed which had succumbed to Johne's. It was important that at the same time general industry awareness was raised through an organised campaign. This should include the distribution of an information leaflet - although it would be advisable for this not to be the first step so that the breeders were more receptive to the leaflet's contents when it did eventually arrive. Pedigree societies were an obvious target for both information distribution and as bodies which could make a more positive contribution to Johne's reduction by introducing their own herd control schemes.

Equally obvious were the cost and logistical benefits of testing for Johne's on a national basis by piggy backing on existing tests for TB and brucella in both beef and dairy herds. It would also be useful if milk samples taken from individual cows for dairy butterfat and protein analysis could be tested for Johne's too. But commercial farmers had to become more involved and among these those that already operated closed herds were an obvious target.

Opportunities for funding also need to be examined. Huge amounts of money would not be needed but pump priming would be useful and this could be sourced both directly from government and/or through government and industry on a partnership basis.

Models for certification schemes needed to be considered carefully with simplicity being crucial. It was considered that a points system, like that used in Australia which identified the number of years a herd had been considered clear of Johne's, could be a useful model because the scores which could range from 1-10 (nil in the case of herd which had not been tested) were easy to understand. All of these ideas were important because it may already be that Johne's was present in 50 per cent

of UK cattle herds. It is already costing the average beef herd £1600 a year but in those herds that were most affected the loss would be significantly greater. Johne's is a dirty, insidious disease which had the potential to become implicated in future debate on the export status of some UK cattle or herds as well as discussion on national human health. This meant it was important for the industry to develop a media strategy in case the possibility of a Johne's/Crohns link is discussed in public.

Thanks go to the following for their input into the workshop and its success:
- **All delegates** - for their time and input in discussion
- **DEFRA** - for their funding, facilitating and hospitality
- **Bill Parish** in particular for his help and guidance with project and protocol
- **International Speakers:** David Kennedy, Jacquemine Vialard, and Peter Franken for their valuable contribution. A special thanks to Merial for sponsoring Jacquemine's talk, it provided the answers to many questions on vaccination issues that needed to be addressed
- **National Speakers:** George Caldow and Bruce Lawson - providing an insight into the work currently being done in this country
- **Group Chairmen** - thank you for the imposition of the task and for a job well done, which allowed everyone to focus on the strategy.
- **Kim Haywood**, for her help with organisation and contacts
- **Natalie Cormack**, for reporting and writing the document, with acknowledgement to Mr. Mick Cranwell (VLA) for proof reading and making adjustments to the text.

Bill Parish then thanked Keith Redpath and Robert Forster for their dedication to the overall strategy on animal health and welfare. Further, he thanked Marion Rawlins and her team for their help. And finally, he thanked Debby Reynolds in her absence, for her contribution to yesterday's proceedings. Bill confirmed that she thinks that strategies such as this one will be key to progressing the government's aims, and is keen to support the industry for the long haul.