

Summary of current research by Massey University's Sheep and Beef Research Group 2017- 2018

SHEEP RESEARCH

Early weaning of twin-born lambs using a herb mix

Studies have been undertaken to investigate the use of the herb mix (chicory, plantain, red- and white-clover) to allow the early weaning of twin-born lambs. At approximately 8 weeks of age twin lambs weighing as light as 14 kg are either being left un-weaned and both the ewe and lamb being offered ryegrass pasture, or are being left un-weaned and both the ewe and lamb offered the herb clover mix or the lambs are weaned and the lamb offered the herb mix, while their ewes are grazed on a ryegrass based pasture. The live weight of the ewes and lambs are being monitored until conventional weaning and optimal early weaning strategies are being investigated.

Rene Corner-Thomas, Lydia Cranston, Steve Morris and Paul Kenyon (Funded by Beef + Lamb NZ)

Should twins born to ewe hoggets be retained as replacements and mated as ewe hoggets?

Mating ewe hoggets (8-9 months of age at breeding) is now an accepted practice for a significant proportion of farmers whose farm systems can grow ewe hoggets to suitable mating weights and provide suitable husbandry care during pregnancy and lactation. A number of hogget-lambing flocks are now achieving a weaning percentage 120%, meaning there are a growing proportion of twin-lambs being produced by hoggets. Most farmers do not retain the ewe offspring born to hoggets as they are born somewhat later and are smaller than lambs from mixed-age ewes. While this practice enables a production efficiency gain over the ewe's lifetime, it does not enable any genetic gain generated by using a younger ewe flock to be harvested. In addition, previous research at Massey University has shown that while these ewes are lighter as a result of being twin born from a hogget, they actually produce the same weight of lamb weaned as those born to mixed-age dams. Thus, there is a potential efficiency gain by producing more weight of lamb weaned per unit of maternal weight. However, those trials did not breed the hogget offspring until they were 18 months of age themselves; there is need for new knowledge about the long-term effects of breeding ewe progeny of ewe hoggets at 8-9 months of age. This is a multi-year study in which progeny born to hoggets are themselves being bred as hoggets in 2018.

Hugh Blair, Paul Kenyon, Rebecca Hickson, Steve Morris (Funded by Beef + Lamb New Zealand)

Should twin-born ewe lambs be grown to heavy weights when mated as a hogget?

With the availability of alternative forages such as red clover, chicory and plantain, some farmers are able to achieve hogget mating weights in excess of 50kg. Farmer experience suggests that these animals may grow to excessive mature weight which erodes their lifetime profitability due to increased feed consumption. If this observation is correct, there may be an optimal pre-mating growth strategy for ewe lambs/hoggets that will limit the negative impact of excessively heavy mature ewes while still achieving high hogget breeding performance. In 2018 hoggets will be bred at industry minimum weights (40 – 42 kg) or at heavy weights (+45kg) The outcome of this aspect of the project will be proof as to whether heavy hoggets at breeding either have heavier mature weights or not. If it is found that they grow to heavier mature weights, data will be collected to demonstrate what affect this heavier mature weight has on ewe production efficiency. This research will assist farmers in understanding the consequences of excessive ewe lamb growth.

Hugh Blair, Paul Kenyon, Rene Corner-Thomas, Steve Morris (Funded by Beef + Lamb New Zealand)

The impact of water on the behaviour and productivity of sheep

A series of studies are being undertaken to assess the water intake behaviour of different sheep classes (lambs, non-pregnant ewes, pregnant ewes and lactating ewes) and the impacts of offering water to their productivity. There has been a great deal of debate recently regarding New Zealand's waterways and water quality. To date, however, the water requirements of sheep in New Zealand has received little attention. We aim to determine sheep drinking water requirements, drinking behaviour and the impacts of offering reticulated water on productivity. Modern technology such as activity monitors, blue-tooth sensors and infrared cameras will be used to record drinking behaviour 24 hours a day. In addition, we will measure total body water turnover by determining the elimination of deuterium oxide.

Rene Corner-Thomas and Paul Kenyon (Funded by C Alma Baker Trust and Massey University)

Forage, growth rate and weaning strategy on carcass and meat quality

Utilising lambs from studies investigating early weaning on different forages, the carcass characteristics and meat quality will be measured. The study will provide understanding of how farm

systems can be orientated to create a meat product that meets the requirements of the discerning consumer. From lambs in various studies at Massey University, the hind leg will be collected and dissected to establish muscle to bone ratio, muscularity and dissectible fat content. The semitendinosus, semimembranosus, quadriceps, biceps femoris and adductor muscles will be utilised to measure meat quality characteristics including collagen content, collagen solubility and intramuscular fat content.

Nicola Schreurs, Rene Corner-Thomas and Lydia Cranston (early weaning studies funded by Beef +Lamb NZ and additional consideration of carcass and meat quality funded by Massey University)

Ewe diet selection in pasture brome sward mixes

Ewe hogget diet selection and grazing behaviour will be monitored on pasture brome sward mixes across the seasons during 2017 and 2018. This will provide some preliminary evidence as to the suitability of pasture brome sward mixes under New Zealand grazing conditions.

Lydia Cranston, Peter Kemp and Ignacio Lopez (Funded by C. Alma Baker Trust)

Ewe longevity in commercial flocks

A long-term research programme is underway to monitor productive longevity and wastage in commercial ewe flocks. Four cohorts of ewe lambs were enrolled (Farm A 2010-born and 2011-born, Farm B 2011-born and Farm C 2014-born) resulting in just over 13,000 enrolled ewes. A proportion of enrolled ewe lambs (approximately 85%) were presented for breeding at 6-8 months of age, while the remainder were not bred until 18 months (two-tooths). Of those that were presented for breeding approximately 70% were at the target 40kg. At four key management times (breeding, pregnancy diagnosis, set-stocking and weaning) liveweights, body condition score (BCS) and reproductive parameters have been recorded. In addition, the date and reason for culling was recorded and tags collected from ewes identified as dead on-farm. Data collection concluded in February 2018, with analysis underway and reporting results expected in June 2019.

Anne Ridler, Kate Griffiths, Paul Kenyon (Funded by Beef + Lamb NZ, Massey University and C. Alma Baker Trust)

Exploring genetic variation of skin thickness and its association with economically important traits in different sheep breeds

Using ultrasound skin thickness data recorded during 2011 to 2016 on 6,082 lambs from the Terminal Romneys for Increased Genetic Gain (TRIGG) farms in the Manawatu region, we recently estimated genetic variation for skin thickness ($h^2=0.26$) and its association with lamb survival ($r_g=0.27$). Also, using calorimetry and infrared thermography in new-born lambs subjected to cold and wet conditions, we found that thin-skinned lambs lost significantly more heat through skin, compared to thick-skinned lambs, and consequently had to produce significantly more heat to maintain body temperature. However, there is no information on skin thickness variation in other sheep breeds. Hence, the current study aims to estimate heritability for ultrasonically measured skin thickness, subcutaneous fat and loin-eye muscle depth and lamb survival, as well as genetic correlations among the traits in sheep belonging to FocusPrime, Texel and Highlander breeds, from the Focus Genetics breeding flocks.

Rao Dukkupati, Hugh Blair and Danitsja Bagley (Focus genetics) (Funded by the C Alma Baker Trust)

Molecular and immunological studies of *Mycoplasma ovipneumoniae*

Chronic non-progressive pneumonia (CNP) is a highly prevalent subclinical form of pneumonia in lambs aged 3-10 months, primarily seen during late summer and autumn. *Mycoplasma ovipneumoniae* is an important causative organism for CNP. CNP is mostly subclinical, with affected lambs showing few clinical signs. Hence, diagnosis is tricky and often delayed, making treatment ineffective. Though there is a commercial vaccine (Ovipast Plus) available in New Zealand for CNP, it is non-protective against *M. ovipneumoniae*. This doctoral project aims to identify and characterise immunogenic proteins of *M. ovipneumoniae*, using genomic and proteomic approaches and to produce and evaluate recombinant proteins displaying immunogenicity. Such proteins could potentially be useful in early disease diagnosis and vaccine development.

Rao Dukkupati, Allan Murray, Neil Wedlock (AgResearch) and Axel Heiser (AgResearch) (funded by AgResearch)

Effect of collagen on lamb meat quality

Lambs slaughtered at 5, 8 and 14 months of age will undergo meat quality testing. A key aspect of the study is the development of an assay that can accurately measure total and soluble collagen. The study will identify the critical age point at which meat quality declines and hence, the point at which intervention becomes more important.

Nicola Schreurs and Michael Parker (Massey Institute of Food Science and Technology) (Funded by Massey University)

Genomic selection for age at puberty

This experiment uses a population of genotyped ewe lambs, which will be assessed for onset of puberty. This will identify ewe lambs that reach puberty at an early age or light weight, and genetic markers for puberty and hogget reproductive success can be investigated.

Rebecca Hickson, Hugh Blair, Paul Kenyon and Steve Morris (Funded by Massey University)

Genetics of body condition Score

Genetic parameters for body condition score of ewes will be calculated, along with genetic relationships between BCS and production traits. The impacts of various BCS profiles over a production cycle will be investigated. Further genetic markers of BCS in sheep will be evaluated

Rebecca Hickson, Paul Kenyon and Dorian Garrick (Funded by Massey University, NZ Merino, Focus Genetics)

Sheep udder abnormalities

A three-year longitudinal study involving 1200 commercial ewes commenced in 2016. This project aims to identify udder traits that are related to lamb survival and lamb growth, and to identify udder traits that farmers can use to assist in decision of which ewes to cull or retain in the flock. Examples of udder traits measured include palpation of the udder and teats, teat length, teat width and appearance of the udder and teats. This project includes additional smaller studies including regular monitoring of ewe udders and milk parameters during lactation (with collaborators at Lincoln University), the prevalence and changes in udder defects on commercial sheep farms, expert opinion on udder defects, and more intensive studies of ewes with specific udder defects.

Anne Ridler, Kate Griffiths, Paul Kenyon, Sam Peterson, Andy Greer (Lincoln University) (Funded by Beef + Lamb NZ and C. Alma Baker Trust)

Production, behaviour and welfare of dairy ewes

Trials at Spring Sheep Dairy aim to compare effects of different management systems on production, walking and lying behaviour, health and welfare of ewes.

Sam Peterson Carolyn Chylinski, D Luo, Karin Schütz, Katherine Lowe, David Stevens, Sue McCoard (AgResearch) Thomas MacDonald (Spring Sheep Dairy) (funded by MBIE through AgResearch)

Mastitis and health examination of dairy sheep

The udder health and general health of a commercial sheep dairy flock will be monitored for six months to determine mastitis prevalence and to begin an on-line sheep health recording system.

Sam Peterson, Emilie Vallee, Mark Collette, Alex Grinberg, Ali Goldansaz (University of Alberta) Sandie Shivas (NEER enterprises) (Funded by MURF, NEER Enterprises and Mitacs Canada).

Drivers of pre-weaning growth in young ruminants

This project aims to determine factors affecting ewe milk production and its impact on lamb growth. Additionally the project aims to understand rumen development and the role of energy and protein intake on the growth of young ruminants prior to weaning.

Sarah Pain, Patrick Morel, Paul Kenyon and Hugh Blair (Funded by Massey University)

Towards developing support tools for sustainable control of gastrointestinal nematodes in sheep

Gastrointestinal parasites are known to cause a level of inappetence and lethargy in animals. Studies are being undertaken to quantify these effects by using the proxy of activity measured with accelerometers and GPS measurements

Bill Pomroy, Rene Corner- Thomas and Ian Scott (Funded by Massey University and New Zealand Foreign Affairs Student Scholarship)

Developing a risk prediction model for flystrike in New Zealand

Flystrike (cutaneous myiasis) is a health issue that causes significant morbidity and mortality in sheep. In a recent survey in 2016, two thirds of New Zealand farmers considered flystrike to be a very important issue on their farms. The aim of this project is to establish and validate a model that can be used to predict the risk for flystrike based on weather parameters and project the effect of climate change in New Zealand. The longer term goal is for this model to be adapted for general public use via the internet.

Bill Pomroy, Paul Kenyon and Kevin Lawrence (funded by NZ Merino)

Effect of forage crops on the accumulation of Cadmium in sheep liver.

The aim of this study was to assess the effect of the variable Cd concentration in the pasture species rye grass, chicory and plantain on the accumulation of Cd in the offal of sheep using liver as the target sampling organ. The research was designed to investigate the potential impact (if any) of high Cd

forage crops on animal accumulation rates of this heavy metal, and to make provisional conclusions of the potential risk to export markets should these animals exceed the current food safety guidelines at an age much younger than the current 30 month limit.

Stefan Smith and Chris Anderson (Funded by Massey University, FLRC and MPI)

Determining the bioavailability of Cadmium in sheep fed forage crop diets high in Cadmium and whether grazing patterns affect the accumulation of Cd in lambs

In an earlier project (2017), Cd accumulation occurred in lambs fed different forage crops high in Cd. Determining whether Cd accumulation is permanent or temporary and whether different grazing strategies affect Cd concentrations within offal may help mitigate any potential risk of exceeding international Cd guidelines.

Stefan Smith and Chris Anderson (Funded by MBIE, Massey University, FLRC)

Abattoir screening of carcasses to determine the prevalence of Johne's disease within New Zealand flocks.

In New Zealand, Johne's disease annually costs the red meat industry millions of dollars in lost production, with losses attributed to animal deaths from clinical disease. Mitigating this cost on farm requires the prevalence of clinical disease to be accurately recorded so that management changes and vaccination protocols can be financially justified. Currently there are no diagnostic tests available to measure the true prevalence of clinical Johne's disease on farm. This study has developed a new, real time test that can identify clinically affected carcasses, with a sensitivity and specificity of 100% each respectively. This provides a means to now mass screen sheep at time of slaughter, allows on farm prevalence to be determined and has potential to enable farmers to now make informed decisions on whether these control measures are financially suitable for their individual farming system.

Stefan Smith (Funded by Massey University)

Improving the quality of live-weight and body condition score data

This project will allow farmers to preload the exact time animals are removed from feed, the type of feed consumed, reproductive data (i.e. breeding date, number of fetuses) and date of last shearing (in the case of sheep) and the weigh system will then adjust the actual recorded weight to provide more accurate data for informing nutritional and management decisions on farm. While the advantages of body condition score are well established farmers do not use the management tool. What is required is a reliable relationship between body condition score and liveweight. The second

aim of this project is that farmers will hopefully only need to record one body condition score in an animal's lifetime and future body condition scores will be predicted by live weight at a given time.

Paul Kenyon, Rene Corner-Thomas, Steve Morris and Hugh Blair (Funded by Massey University)

Bio-economic modelling of sheep farming systems

Can a model of New Zealand sheep farming systems be developed which is effective at investigating the profitability of sheep farming scenarios while improving user understanding of the system? The objectives of this project are to i) develop a dynamic, bio-economic simulation model of a New Zealand sheep farming system, ii) validate the model accuracy and relevance through engagement with stakeholders and iii) use the model to investigate the profitability of alternative strategies in sheep farming systems.

Peter Tozer, Lydia Cranston, Ramilan Thiagarajah and Paul Kenyon (NZ Merino funded)

Mid-Infrared Reflectance Spectroscopy as a tool for forage feed composition prediction

Attenuated Total Reflectance Fourier Transform Infrared (ATR-FTIR) spectroscopy, in the Mid-infrared (MIR) region is used for the prediction of chemical components in forage feeds. Data collection was carried out on 140 herbage mix samples (plantain, clover, chicory, rye grass). The majority of forage feed chemical components correlated well ($R^2 > 0.7$, $RPD \geq 2$) to MIR reflectance data. Currently, 124 pure sward (leaf and stems) samples and 39 tropical forages samples are investigated. ATR-FTIR spectrometers are available in a hand-held form, and the results of this research suggest, so far, that in situ forage quality analysis could be performed using MIR reflectance spectroscopy.

Patrick Morel, Mark Waterland, Paul Kenyon (Funded by Massey University)

Design of a genetic improvement scheme for the Qianbao flock

The scale of the Qianbao operation (100,000 ewes and 300 rams) and the collection of individual animal measurements (eg liveweights, number of lambs born, lamb growth rate) offers a good opportunity for Qianbao to manage its own Hu Yang genetic improvement programme by selecting the best ewes and mating them to the best rams. By establishing its own ram breeding nucleus flock, Qianbao takes responsibility for which animal traits that will be improved. That is, Qianbao will not be dependent on the decisions of others regarding the genetic direction of their flock. To improve the genetic merit, and thereby the production efficiency, of Hu sheep used in the Qianbao intensive indoor farming operation. Initial traits for improvement are ewe size (to increase the birth weight of lambs

and therefore increase lamb survival) and lamb growth rate (to decrease the time taken to slaughter for meat production).

Dorian Garrick, Hugh Blair, Paul Kenyon, Steve Morris, Runlin Ma (Chinese Academy of Sciences) and Jianfeng Gao (Chinese Academy of Sciences) (Funded by Qianbao Farm, Jiangsu)

Measurement of animal performance, including liveweights and pregnancy rates

The purpose of this project is to establish baseline production and operational protocols that will be integral aspects of measuring the success of future projects. Data will be collected on a minimum of 1000 ewes and their lambs over three years. The same ewes will be measured in each of the three years. The baseline data will be analysed by Qianbao staff as advised by Massey University staff. Massey University staff will audit the data and analyses. The results will be used to provide key production targets to inform future management decisions and research projects. Massey University staff will provide protocols and training for data collection.

Paul Kenyon, Steve Morris, Dorian Garrick, Hugh Blair, Runlin Ma (Chinese Academy of Sciences) and Jianfeng Gao (Chinese Academy of Sciences) (Funded by Qianbao Farm, Jiangsu)

Cost effective feeding program for small ruminant in the Caribbean

The objective of the project is to develop a more sustainable forage-based feeding system for small ruminants within the Caribbean. Towards this end, the first year of the project will emphasize building an understanding of the context through a review of the literature. There will also be an emphasis on identifying the best options of forages or indigenous feed inputs for the development of this system. Accordingly, stakeholders across the region were contacted and asked to identify forages that are important and that are most commonly used by farmers. A list of these forages was generated and samples for each of these forages were collected and exported to New Zealand for evaluation. The main evaluation methods will include wet chemical analysis, ATR-FTIR and NIRS scanning, and in-vitro digestibility assays to compare the effectiveness of ATR-FTIR in predicting values obtained by the other more robust methods of forage evaluation. These activities will inform other project developments in the preceding years including diet formulation and the comparison of different diet forms on the performance of dairy goats during late gestation. Other developments will include conducting in-vivo digestibility trials to determine the nutritive value of Sargassum seaweed as a potential novel feedstuff for ruminants

Patrick Morel, Lydia Cranston and Jennifer Burke (Funded by Massey University)

International Education programmes.

Members of the International Sheep Research Centre team are involved with two MFAT funded education programmes internationally. These include a Veterinary degree twinning programme with the University of Peradeniya in Sri Lanka led by Lachlan McIntyre and an Animal Science programme development project with the Veterinary University in Myanmar led by Penny Back. In addition, our staff are involved with in-country teaching of post graduate students in sheep production systems in Uruguay which also includes students from Brazil, Argentina, Paraguay and Mexico.

Paul Kenyon, Penny Back, Hugh Blair (Funded by MFAT and Massey University)

Improving triplet lamb survival on Australian farms

As in New Zealand the proportion of triplet born lambs in Australia is increasing and their survival is an underlying issue. This projects aims to firstly review all of the know scientific literature on triplet lamb survival and to secondly interview farmers on management practices they use. The combined information will then be used to test and validate a range of management options to improve lamb survival under commercial farming conditions.

Paul Kenyon (Funded by Meat and Livestock Australia)

Flavour map of lamb

Working in conjunction with AgResearch this study aims to integrate sensory profiling, nutritional value and physico-chemical properties of a representative range of NZ lamb to identify eating quality attributes that drive consumer acceptability, identify relationships of these attributes with instrumental and chemical analyses and assess how these variables can be simultaneously managed to improve eating quality.

Nicola Schreurs and Carolina Realini (AgResearch) (Funded by AgResearch)

BEEF RESEARCH

Cow efficiency and stayability

In this project, four groups representing large or small beef cows and high or low milk production potential (Angus, Angus-Friesian, Angus-Jersey, and Angus-Friesian-Jersey) are being evaluated over their lifetime. The study measures the effects of cow size and milking ability on onset of puberty in heifers, reproductive performance (including return to oestrus after first calving), calculated feed intake and efficiency of calf production, as well as lifetime productivity, longevity and cow wastage. The first three cohorts of progeny from these cows have been finished and assessed for growth rate, carcass conformation and meat quality. This project ends in 2018, with end-of-life health assessments to be made on the cows. A mastitis investigation is also being conducted.

Rebecca Hickson, Steve Morris, Paul Kenyon, Nicolas Lopez-Villalobos and Penny Back (Funded by Beef + Lamb NZ)

Genetic susceptibility to *Theileria orientalis* (ikedai)

Theileria orientalis (ikedai) is a tick-borne haemoprotozoan parasite that causes regenerative anaemia in cattle. There have been reports of clinical cases of anaemia in both beef and dairy herds, and death of a small percentage of affected cattle. Anecdotally, there appears to be marked variation in the severity of infection among lines of cattle. This experiment aims to compare the parasite burden of chronically infected calves from different sire lines to determine whether there is sufficient genetic variation to warrant genetic selection for resistance.

Rebecca Hickson, Bill Pomroy, Kevin Lawrence and Kristene Gedye (Funded by C. Alma Baker Trust)

Dairy beef progeny test at Limestone Downs

Surplus calves from the dairy industry are a key component of New Zealand's beef industry, and are a resource that could be used more extensively in beef production. This project aims to quantify the value of using high merit bulls for dairy beef. This project has links with the beef progeny test to explore the relative performance of sires when bred with dairy or beef cows.

Rebecca Hickson, Penny Back, Nicola Schreurs and Steve Morris (Funded by Beef + Lamb NZ Genetics)

Dairy beef progeny test at PAMU

Surplus calves from the dairy industry are a key component of New Zealand's beef industry, and are a resource that could be used more extensively in beef production. This project aims to identify beef bulls with desirable characteristics for breeding with dairy cows to produce progeny that perform well as finishing cattle, whilst also providing the easy calving, short gestation traits desirable in a dairy herd. This project has links with the beef progeny test to explore the relative performance of sires when bred with dairy or beef cows.

Rebecca Hickson, Lydia Cranston, Penny Back, Hugh Blair, Steve Morris, Nicola Schreurs and Nicolas Lopez-Villalobos (Funded by Beef + Lamb NZ Genetics)

Improved meat quality from Friesian bulls

A high proportion of bull carcasses have high pH, requiring their carcass to be used for processing beef. Bulls that have acceptable pH can have the primal cuts sold into higher value markets. This project looks at genetic and environmental factors to identify contributors to acceptable pH meat from bulls

Rebecca Hickson, Nicola Schreurs, Steve Morris and Julie McDade (Greenlea Premier Meats) (Funded by Red Meat Profit Partnership)

Welfare of beef cows

Overseas markets are interested in quality assurance schemes through which they can verify the welfare of the livestock producing the meat. New Zealand's beef cattle farming systems are vastly different from those overseas, so the welfare indicators are likely to be different also. This project aims to evaluate existing overseas welfare indicators for relevance and identify appropriate indicators for NZ systems.

Rebecca Hickson, Richard Laven, Kevin Stafford and Tim Parkinson (Funded by Massey University)

The economic cost of liver fluke (*Fasciola hepatica*) in cattle

The production cost of liver fluke in grass fed cattle has not been well defined either internationally or in New Zealand. Consequently it has largely been considered of limited importance within New Zealand. However, the few studies that have occurred indicate the parasite is widespread in many

northern areas and the west coast of the South Island. Recent overseas studies have indicated that as few as 10 liver flukes will impact on the productivity of a dairy cow whereas earlier studies indicated a much larger number was required. Similar effects are expected with beef cattle. The principal aim of this study is to investigate the economic cost of liver fluke for cattle within New Zealand. A secondary aim is investigate cost effective control options. The main target will be dairy cattle but by extrapolation it will extend to beef cattle, especially studies on young cattle.

Bill Pomroy Andrew Dowling, Laryssa Howe, Ian Scott (Funded by Massey University)

Beef and lamb by-products and offal on the palatability of diets for cats

Beef and lamb by-products and offal are used by the pet food industry as a raw “meat” source. Pet owners are increasingly providing their pets with natural, raw meat diets. This study is designed to quantify the influence these diet ingredients have on the acceptability of raw meat diets for cats.

Nicola Schreurs, Dave Thomas (Feline Nutrition Unit, Massey University) and Michael Parker (Massey Institute of Food Science and Technology) (Funded by Massey University and Ziwi Petfood)

Utilisation of automatic feeders for maximising the growth of young calves.

Research evidence suggests that improved early life nutrition of calves allows for faster growth rates at later stages, earlier finishing and improved characteristics of the carcass. Automatic feeders allow for increased frequency of milk or milk replacer meals allowing for higher intakes therefore, improving the nutrition of the calf before weaning. These systems have potential for improving the quality of weaned calves, including surplus calves out of the dairy industry, for beef production. This study carried out in conjunction with AgResearch investigated milk allowance via automatic feeders on calf performance and included the monitoring of concentrate intake using automated meal feeders.

Nicola Schreurs and Ajmal Khan (AgResearch) (Funded by AgResearch)

New Generation Beef

Considers a new class of beef using surplus calves from the dairy industry that are grown and slaughtered at, or before, one-year of age. This approach has advantages in terms of utilising a currently “unwanted” animal from the dairy industry, reducing environmental foot print due to animals being on farm for less than a year compared to finishing at a later age, providing better feed efficiency due to only feeding animals during their accelerating phase of growth and having animals

slaughtered prior to the first winter, reducing the stock units over the winter period, aiding feed budgeting and assisting farms with sensitive soils.

Nicola Schreurs, Steve Morris, Paul Kenyon, Hugh Blair, Rebecca Hickson, Dorian Garrick (Funded by C Alma Baker Trust, Al Rae Centre for Genetics and Breeding and Beef +Lamb NZ Genetics)

Performance of weaned male Bali cattle fed different mixtures of leucaena and gliricidia

Gliricidia is abundantly available in Indonesia, but not optimally used to feed cattle due to low palatability. There have been mixed results on the performance of fattening cattle fed gliricidia. The intake of gliricidia may be improved by mixing it with highly palatable feeds such as leucaena. There is no information available on what is the optimum ratio of leucaena and gliricidia that give good feed intake and live weight gain of male Bali cattle. The objective of this experiment is to evaluate the effect of mixing gliricidia with leucaena and rice bran on feed intake and growth rate of weaned male Bali cattle.

Steve Morris, Rebecca Hickson, Bill Pomroy, Penny Back and Dahlan Dahlanuddin (University of Mataram, Indonesia) (Funded by MFAT and Massey University)

Laos Quality Beef Initiative

A five-year development project is aimed at improving the Laos beef production in medium sized herd (20 – 100 cattle) using improved tropical C4 grasses and legumes. Massey is a contractor to this project through Agricultural Services Limited (ASL). Farmers that are enrolled in the project are being monitored for cattle live weight gain and carcass weight produced and quality of beef produced of these farms

Steve Morris, Dennis Radford (ASL) (funded by MFAT)

Mastitis in beef cows

This project looks at the pathogens causing mastitis in beef cows. Relationships between somatic cell count, microbiology and histology will be examined. This is a pilot study to determine the extent of the problem and explore probable causes and consequences.

Sam Peterson, Rebecca Hickson, Mark Collett (Funded by Massey University)

Breeding better cattle for better beef

It is relatively straightforward to describe the attributes of a good terminal sire, but much more complex to characterise the desirable attributes of a good maternal sire whose role is to produce daughters that will be productive as breeding cows. This project is developing predictors for describing beef cows using mature cow condition scores and weights, along with offspring weights, and genomic information. The maternal cow performance data is being sourced from Beef and Lamb Genetics (BLG) progeny test programmes.

Dorian Garrick (Funded by Beef + Lamb NZ Genetics)

Identifying genes and causal mutations that can be used for improving beef cow reproductive performance by advancing puberty.

An AgResearch selection experiment using Angus cattle resulted in about 70 days divergence in age at puberty after 23 years of divergent selection for scrotal circumference in males and age at puberty in females. This Beef and Lamb Genetics (BLG) funded project has sequenced 17 sires from that selection experiment in order to identify genomic regions, genes, and possible causal mutations that might have been responsible for the divergence in age at puberty. This information will be used for genomic prediction of age at puberty in cattle.

Dorian Garrick (Funded by Beef + Lamb NZ Genetics)

Modelling the distribution of *Theileria orientalis* to further our understanding the effects of this pathogen

Theileria orientalis genotype Ikeda is a tick-borne protozoan which has now been in the country for about 8 years. Once infected a cattle beast remains infected for life with the level of infection controlled by the immune system. Its effects are most dramatically seen with dairy cows suffering clinical signs of anaemia in early pregnancy and sometimes death but beef cattle are similarly affected, especially when infected around the time of calving. Its distribution is controlled by that of the tick *Haemaphysalis longicornis* and recent studies have developed a variety of models to predict its distribution. The country is now divided into endemic zones (northern two-thirds of the North Island) and uninfected zones. This disease will continue to cause problems for cattle moving from the uninfected zone into the endemic zone, for young calves born in the endemic zone as there is apparently little maternal immunity passed to them, and for adult cattle stressed in some way. Further studies are required to develop effective control strategies.

Kevin Lawrence, Bill Pomroy, Rebecca Hickson, Kristene Gedye (funded by Massey University)

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