

Teagasc

Research Report 2006

www.teagasc.ie

BEEF AND SHEEP PRODUCTION RESEARCH

Grange Beef Research Centre Dunsany, Co. Meath
(Tel: 046-9061100 Fax: 046-9026154)

and

Animal Production Research Centre, Athenry, Co. Galway
(Tel: 091-845845 Fax: 091-845847)

Members of the Teagasc Authority, 2006

Dr. Tom O' Dwyer (*Chairman*)
Mr. James Beecher
Mr. Gerry Henchy
Mr. Ruaidhri Deasy
Dr. Patrick Fottrell
Mr. Joe Fitzgerald
Mr. Tom Gill
Mr. Patrick Kelly
Ms. Anna Mae McHugh
Mr. Michael O'Dwyer
Mr. James Brett

Director of Teagasc

Mr. Jim Flanagan

The Teagasc *Research Report* is published annually in 7 sections, as follows:

Dairy Products Research Centre
The National Food Centre
Grange and Athenry Research Centre (Beef and Sheep Production)
Dairy and Pig Production Research Centre, Moorepark
Oak Park Research Centre (Crop Production and Horticulture)
Johnstown Castle Research Centre (Soils, Environment and Land Use)
Rural Economy Research Centre (Agri-Food Economics)

Available from Teagasc, Oak Park, Co. Carlow. Tel +353 53 70200

Table of Contents

STAFF LIST	x
HIGHLIGHTS FROM THE 2006 BEEF RESEARCH PROGRAMME	1
HIGHLIGHTS FROM THE 2006 SHEEP RESEARCH PROGRAMME	8
GENETICS AND BEEF SYSTEMS	11
Performance of beef suckler cows with low and high residual feed intake on grass-based systems	11
Effect of residual feed intake on immune function of beef suckler cows at weaning and housing.....	11
Effect of weaning strategy on immune function of beef suckler cows and their calves	11
Relationship between beef suckler cow colostrum production and immunoglobulin G ₁ absorption in their calves	12
Growth, muscular scores and carcass traits of progeny from sires differing in breeding value for carcass conformation	13
Effect of sire genotype for the beef production sub index and carcass weight on progeny performance	16
Effect of contrasting genetic merit for beef production on calving performance in beef herds.....	17
The relationship of scores and measurements on the live animal and carcass grades with carcass traits.....	19
Pasture or concentrate finishing of Holstein-Friesian, Aberdeen Angus x Holstein-Friesian and Belgian Blue x Holstein-Friesian steers for beef production	22
Comparison of Holstein-Friesian, Norwegian Red and Jersey young bulls for beef production.....	34
Effects of level and method of feeding on muscle chemical composition in steers	37
Performance of finishing beef steers offered total mixed rations constituted at feeding or ensiling.....	38
Heterogeneity of genetic parameters for calving difficulty in Holstein heifers in Ireland	40

The effect of breed on growth rate and body measurements in beef × dairy and dairy male cattle	41
GRASSLAND AND FORAGE CONSERVATION	43
Yield and weed suppression of grass / legume mixtures compared with monocultures in the first year after sowing.....	43
Growth and development of seedlings of perennial clover species compared with perennial ryegrass	44
Growth and intake of weanling heifers managed on pasture or indoors on grass silage during winter	45
Growth of steers grazing perennial ryegrass cultivars bred for normal or elevated concentrations of water soluble carbohydrates.....	47
Intake, digestibility, N metabolism and growth in growing steers offered zero-grazed grass supplemented with sucrose	48
Intake, digestibility and growth in steers offered grass silage supplemented with sucrose	50
Chemical composition of six <i>Lolium perenne</i> L. cultivars, two of which were bred for elevated water-soluble carbohydrate concentration	50
Aerobic stability and deterioration of grass silages differing in glucose content	52
Aerobic stability and deterioration of grass silages after mixing with concentrates at feedout.....	54
Fungal contamination of eight precision-chop grass silages on Irish farms.....	55
Stover development in forage maize: interaction of harvest date, plastic mulch and cultivar.....	56
Cob development in forage maize: interaction of harvest date, plastic mulch and cultivar.....	57
Mycotoxins and other secondary metabolites produced by <i>Penicillium</i> spp. isolated from baled grass silage in Ireland.....	60
Factors controlling the conservation characteristics of baled silage, and their interactions.....	61
NUTRITION AND PRODUCT QUALITY	63
Rumen fermentation and plasma metabolites in steers offered concentrates differing in energy source either as a supplement to grass silage or <i>ad libitum</i>	63

Rumen fermentation, microbial protein synthesis and nutrient flow to the omasum in beef cattle offered grass silage, maize silage and whole-crop wheat.....	63
Intake, rumen fermentation and nutrient flow to the omasum in beef cattle offered grass silage fortified with sucrose and/or supplemented with concentrate.....	64
Effect of grass regrowth interval on intake, rumen digestion and nutrient flow to the omasum in beef cattle.....	66
Differentiation of beef according to the pre-slaughter diet of cattle using the stable isotope ratios of carbon and nitrogen.....	67
Temporal change in the carbon stable isotope ratios of beef following a change in ration composition.....	69
Hooves: a new tissue for high-resolution reconstruction of bovine dietary histories.....	71
How fast are ratio dietary carbon and nitrogen replenished in bovine muscles?.....	71
Experimental determination of turnover of carbon isotopes in bovine hair and hoof.....	72
Supplementation of heifers with ruminally-protected polyunsaturated fatty acids (PUFA): effects on colour stability of retail-packaged minced beef.....	72
Feeding a diet with CLA-enriched beef improves the diabetic phenotype in ob/ob mice.....	74
The record of dietary change and climatic conditions in the stable isotope composition of different sheep tissues.....	75
Accumulation of intermediates during in vitro ruminal fermentation of polyunsaturated plant oils and oilseeds.....	76
Accumulation of biohydrogenation intermediates during in vitro ruminal fermentation of camelina oil-based rations.....	77
LABOUR USAGE AND ENVIRONMENT	79
Model-based calving monitor using real time image analysis.....	79
Intensity of agricultural contractors usage on suckler beef farms in Ireland.....	81
Effect of low-rate intermittent aeration on nutrient concentration and homogeneity of beef cattle slurry.....	82

SYSTEMS MODELLING	85
The Grange Beef Model: A mathematical model of Irish spring-calving suckler beef production systems	85
Investigating development options for Irish suckler beef farmers: a mathematical modelling approach	88
HEALTH AND WELFARE	92
Transportation stress in young bulls: alters expression of neutrophil genes associated with the regulation of apoptosis, tissue remodeling, margination, and bactericidal function.....	92
Gene expression profile of bovine neutrophils during transportation stress.....	98
Effect of floor type on the welfare and performance of finishing beef steers	116
Effect of sea transport from Ireland to the Lebanon on performance, behaviour and physiology of bulls.....	117
Temporal patterns of inflammatory gene expression in local tissues after banding or burdizzo castration in cattle	119
Effects of banding or burdizzo castration of bulls or cortisol infusion on neutrophil phagocytosis and respiratory burst, CD62-L expression, and serum Interleukin-8 concentration	124
GRANGE LABORATORIES: TECHNIQUE AND DEVELOPMENT	132
Fibrinogen: investigation of alternative method of analysis.....	132
ATHENRY RESEARCH REPORT (CATTLE)	133
Negative energy balance and gene expression in dairy cow metabolic and reproductive tissues.....	133
Repeatability of embryo survival beef heifers	134
Identification of proteins that regulate uterine function in the cow insulin-like growth factor binding protein (IGFBP) expression in the bovine uterus throughout the oestrous cycle	135
Effect of dietary ω -3 polyunsaturated fatty acid supplementation on hormone and metabolite concentrations and corpus luteum size in beef heifers	137
Relationships between feed, rumen fluid, blood plasma, follicular fluid and endometrial tissue concentrations of the omega-3 (ω -3) fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) in cattle	138
Omega-3 fatty acid intake and immune response indicators in cattle	139

Uterine gene expression in cows of high and low fertility	140
An examination of the molecular mechanisms controlling the tissue accumulation of conjugated linoleic acid (CLA) in cattle	141
Development of a bovine intermuscular adipocyte cell line.....	142
Uterine gene expression of cows with high and low polyunsaturated fatty acid concentrations	143
The association between circulating metabolic hormones during the early post partum period and subsequent fertility in dairy cows	145
SHEEP PRODUCTION	149
Effects of extended grazing, grass silage feed value and winter shearing on ewe and lamb performance	149
The effects of herbage allowance and frequency of allocation, and silage feed value on lamb birth weight and subsequent performance when offered to ewes in mid gestation.....	150
The effects of grazing date and management of autumn pasture on subsequent herbage yield.....	152
An evaluation of grass allocation management to single and twin bearing ewes in late pregnancy on ewe and subsequent lamb performance.....	153
The effects of herbage allocation and concentrate supplementation on the performance of replacement ewe lambs offered extended grazed pastures.....	154
Effect of maturity of maize at harvest and system of ensiling grass silage on ewe performance and subsequent lamb growth rate	156
Effect of season of shearing on ewe productivity and subsequent lamb performance	156
An on-farm evaluation of the effect of season of shearing on ewe productivity and subsequent lamb performance.....	157
An evaluation of the effect of plane of nutrition at different phases during the rearing phase of replacement ewes, differing in genotype, on lifetime performance	157
The effects of grazing management, date of closure and subsequent harvest date on herbage yield and feed value	157
Organic system for sheep at Mellows.....	158

Hill Sheep Farm: flock performance details for 2006	159
Habitat selection of hill sheep on the Teagasc hill sheep farm, using satellite tracking and field observations	162
The impact of hill sheep activity on the population dynamics and diet of small mammals	163
Sustainable agri-environmental management of hill and mountain peatland	164
Pedigree Galway sheep – population size and performance details	165
Genetic diversity in Galway sheep compared with Suffolk and Texel breeds	165
Conservation of semen from Galway rams.....	166
Evaluating the impact of pedigree sheep breed improvement programme (PSBIP) for terminal sire breeds	167
Association between ewe breed type and longevity in a lowland production system	168
Performance of pedigree Belclare sheep flocks.....	170
Effects of BMP15 and GDF9 mutations on ovarian follicle population and gene expression in Cambridge ewes	171
Effect of sperm dose on pregnancy rate in sheep	172
Effect of nematophagous fungi on <i>Teladorsagia circumcincta</i> eggs in ovine faeces maintained at 16°C.....	173
Development of a PCR diagnostic test for the rapid detection of the nematophagous fungus <i>Duddingtonia flagrans</i>	175
Anthelmintic efficacy on ovine parasitic nematode populations on the Teagasc sheep farms	178
Efficacy of levamisole on ovine parasitic nematodes and whether efficacy of benzimidazole is improved by fasting lambs prior to benzimidazole administration	179
The evidence for anthelmintic resistance in farms in Co. Kilkenny.....	180
The effectiveness of copper oxide wire particles as an anthelmintic in purebred Suffolk lambs exposed to a natural nematode challenge post weaning.....	181

The epidemiology of <i>Lymnaea truncatula</i> and the prevalence of <i>Fasciola hepatica</i> within hosts (snail and sheep) on the Teagasc hill sheep farm: preliminary results	182
SCIENTIFIC PUBLICATIONS	185
TECHNICAL PUBLICATIONS	192

BEEF AND SHEEP RESEARCH
Grange Beef Research Centre, Dunsany, Co. Meath
Animal Production Research Centre, Athenry, Co. Galway
Staff List 2006

E.G. O'Riordan, B.Agr.Sc., Ph.D. (Head of Centre)

Grange

Beef Production Department

P. O'Kiely, M.Agr.Sc., Ph.D. (Acting Head)

M.J. Drennan, B.Agr.Sc., M.S., Ph.D.

M.G. Keane, M.Agr.Sc., M.S., Ph.D.

A. Black, B.Agr.Sc., Ph.D.

M. McGee, B. Agr.Sc., Ph.D. MBA

A.P. Moloney, B.Sc., Ph.D.¹

H. Scully, B. Eng.²

B. Earley, B.Sc., H.Dip.Ed., Ph.D.

R.J. Fallon, B.Agr.Sc., Ph.D.

H. Taweel, B.Agr.Sc., Ph.D.

P. Crosson, B.Agr.Sc., Ph.D.³

Technicians

J. Marron, A. McArthur, V. McHugh, J. Munroe, J. Farrell (Livestock Officer), P. Blount, N. Blount, M. McGuire, M. Donlon⁴, T. Dunne, J. Larkin, MIBiol, CBiol, M. Munnelly⁵, S. O'Connell, N. Tonge, A. Marley, D. Prendiville (M. An. Sc.), M. Nolan, B. Weldon⁶ (B.Agr.Sc.), E. Mulligan⁶

Walsh Fellows

M. O'Brien (B.Sc.), J. Hickey (B.Agr.Sc.), J. McEniry (B.Sc.), D. Owens (B.Agr.Sc.), K. Walsh (B.Agr. Sc.), J. McMonagle (B.Agr.Sc.), K. Buckham (B.Agr. Sc.), C. Daly (B.Agr. Sc.), L. Scott (M.R.C.V.S.), B. Bojlul (B.Sc. Agri, M.Sc.), W. Pang (M.R.C.V.S.), A. Price (B.Sc., M.Sc.), B. Cummins (B. Agr. Sc.), S. Grace (B.Agr.Sc.), C. O'Neill (B.Agr.Sc.), M. Mazurek (B.Agr.Sc.), B. McDonnell (B.Agr.Sc.), E. Lynch (B.Sc.), E. McGeough (B.Agr.Sc.), B. Campion (B.Agr.Sc.), F. Roehrl (B.Agr.Sc.), A. M. Clarke (B.Agr.Sc.), S. Conroy (B.Agr.Sc.), A. Navarro (B.Agr.Sc.), R. Belletti (B.Agr.Sc.)

Centre Staff

Administrative Officer: A. Dowling

Technician: P.L. Murray (Stores),

Stores Assistant J. Gill (Acting)

Farm Steward: F. Collier

Executive Assistants: S. Caffrey⁴, B. Farrell, A.

Gilsenan, M. McEvoy, M. McDonnell, M.

Nicholson⁴, M. Weldon⁴

Farm Staff

M. Clarke, G. Costello, J. Costello, M. Cottrell, B. Doyle, B. Duffy, T. Fahy, S. Fagan, P. Farrell, D. Gorman, F. Gorman, J. Grimes, J. Horan, P. Kane, L. Kelly, H. Mulligan, P. McCann, P. McGovern, P. Reilly, M. Ryan, F. Smith, J. Weldon, P. Whelan, T. Curry, L. Kirke,

Canteen and Cleaning Staff

P. Killion⁵, P. Martin, M. Geraghty, S. Loughran, S. Martin

Athenry

Sheep Production Department

J.P. Hanrahan, B.Agr.Sc., M.S., Ph.D. (Head)

B. Good, B.Sc., Ph.D.

M. Walsh, B.A., M.Sc.,

T. Keady, B.Agr.Sc., Ph.D.

Technicians

A. Curley, A. Donovan, B.Agr.Sc., M.An.Sc., T.

Lally, N. McNamara, L. O'Malley⁷, H. Walsh, W.

Kelly⁸

Beef Production Department (Athenry)

J. M. Sreenan, B.Agr.Sc., Ph.D., D.Sc. (Head)⁹

M. G. Diskin, B.Agr.Sc., Ph.D.

D. G. Morris, Ph.D.

R. Fitzpatrick, B.Sc., Ph.D.²

S. Waters, B.Sc., Ph.D.²

Technicians

W. Connolly, A. Glynn, P. Joyce, J. Nally

Walsh Fellows

O. Casey, B.Sc., S. Childs, B.Agr.Sc., L. Costello, B.Sc., E. Gillis, B.Sc., S. Hugentobler, B.Agr.Sc., H. Haycock, B.S., C. Lynch, B.Agr.Sc., S. McCarthy, B.Agr.Sc., D. Howard, B.Sc., P. Kelly, B.Sc., T. Patten, B.Sc. N. Quinn, B.Sc., B. Williams, B.Sc.

Centre Staff

Administration Officer: J. O' Mahony

Supplies Officer: J. Golden

Farm Manager: S. Murphy

Executive Assistants: M. Clarke⁴, M. Kelly⁴, M.

Curley

Farm Staff

C. Farragher, J. Hanley, M. Walsh, P. Connolly, P. Creven, T. Murphy, F. Burke, G. Burke, J.N. Walsh, P.J. Hughes, P. Murphy, T. Keane, C. Caulfield, G. Somers, M. Somers, C. McNamara, M. Kilkelly, M. Shiels, M. Ward, A. Monaghan, P. J. Hastings⁷, M. Murphy

Porter and Kitchen Staff

P. Conneely, J. Regan, E. Sheils, A. Fahy, N.

Somers, M. Somers, E. Moriarty, S. Hally

¹Staff member of Ashtown Food Centre based at Grange; ²Contract Scientist;

³Moorepark staff member; ⁴Job Sharing;

⁵Leave of Absence; ⁶From May 2006;

⁷Based at Hill Sheep Farm, Leenane;

⁸Based at Oak Park; ⁹Retired June 2006.

