

Further Information on the Modules that Make Up The Diploma in Ruminant Nutrition

Taken from the Module Descriptors

Module 1

Module Title:	Ruminant Animal and Feed Production
Module Number:	A4065
Credit Value:	15
Level:	4

Rationale and Context:

The ability to communicate effectively at all levels within the ruminant feed industry requires a thorough understanding of both ruminant production systems and the animal feed industries. This module will develop in students a thorough understanding of the dairy, beef and sheep industries, and the major systems of animal production systems used in the UK. It will also inculcate an awareness of the structure and operational characteristics of the ruminant feed industry. The module will be delivered by independent learning and provide students with an opportunity to demonstrate both their IT and communication skills. The knowledge and skills gained will provide a foundation and underpin the three subsequent modules.

Intended Learning Outcomes:

1. Outline the size and structure of various sectors of the UK ruminant production industry and the markets for ruminant products.
2. Review the main milk, beef and lamb production systems used in the UK.
3. Identify the major internal and external factors affecting the demand and supply of ruminant products.
4. Assess the size, structure and operational characteristics of the ruminant feed industry.
5. Identify the internal and external factors affecting operational efficiency of a ruminant feed mill.

Indicative Content:

Dairy production: Size and structure of the dairy industry, trends and markets for dairy products. The dairy production cycle, feeding, breeding and management strategies. Housing, welfare and environmental requirements. Milk pricing and factors affecting physical and financial performance.

Beef production: Size and structure of the industry, trends and markets for beef and beef products. Intensive and extensive beef production systems. Breeding and finishing systems. Marketing and grading of beef cattle. Housing, Welfare and environmental requirements. Factors affecting physical and financial performance.

Sheep production: Size and structure of the industry, trends and markets for lamb and sheep products. Stratification of the sheep industry. Breeding and finishing systems. Marketing and grading of lamb. Housing, welfare and environmental requirements. Factors affecting physical and financial performance.

The feed industry: Size and structure of the ruminant feed industry. Nature of raw materials, volumes, sources and handling. Processing methods, grinding, mixing and pelleting. Transport and logistics. Customer service and support. Health and safety.

Factors affecting animal and animal feed production: Political, economic, legal, environmental and social factors affecting the demand and supply of ruminant products and feeds. Constraints to production and benchmarking against industry standards.

Assignment 1: Ruminant products (33% of total mark over all three assignments)

The assignment will consist of a PowerPoint presentation (max 16 slides) with accompanying notes. Students will prepare a briefing note for policy maker on trends in production (quantity and quality of ruminant products (e.g. meat or milk) relative to market demands.

Assignment 2: Dairy or beef or sheep production (34% of total mark over all three assignments)

The assignment will consist of an enterprise appraisal for a dairy or beef or sheep production system with which the student is familiar. The enterprise appraisal should describe the system used, and compare both the physical and financial performance with published targets. The strengths and weaknesses of the enterprise should be identified and recommendations for improvement suggested.

Assignment 3: Insight into the feed industry (33% of total mark over all three assignments)

The assignment will consist of a report containing two parts and will be in the form of a company report. The first part will provide an overview of the size and structure of the UK animal feed industry. The second part will detail the processes involved with sourcing and converting raw materials into compound feeds in a feed mill with which the student is familiar. The report should identify key stages in the manufacturing process, and the size of the market for products produced.

Student will be expected to prepare each assignment using appropriate reference sources using Microsoft Office. The reports should include a variety of tables, graphs and figures as appropriate. Further guidance will be provided in the assignment briefs.

Module 2

Module Title:	Ruminant Feeds and Nutrient Supply
Module Number:	A5096
Credit Value:	15
Level:	5

Rationale and Context:

This module examines the anatomy, function and principles of nutrient availability to the rumen micro-organisms and the host animal. Forage production and compound feed manufacturing will also be considered. The module then goes on to give the learner a knowledge of feed analysis and factors affecting voluntary feed intake. Lectures will be supported by practical laboratory work, wherever possible. This module will build on the concepts introduced in '*Ruminant Animal and Feed Production*' and the knowledge and skills gained will be developed further in '*Rationing and Feeding Systems*' and '*Developments in Feeds and Feeding*'.

Intended Learning Outcomes:

1. Identify the nutrients required by animals, and the chemical components of feed that contribute to nutrient supply.

2. Explain the structure and function of the ruminant digestive tract.
3. Analyse animal feed to determine their fermentation quality, chemical composition and nutritional value.
4. Interpret a forage analysis report or feed label.
5. Explain forage production and compound feed manufacture.

Indicative Content:

Feed ingredients and their chemical composition:

The biochemical nature of feeds in terms of sugars, starch, fibre, fatty acids, protein and amino acids, minerals and vitamins and their assessment in feeds.

Ruminant physiology and digestion:

Anatomy and physiology of the ruminant digestive system, rumen development and the digestive process in different sections of the gastro-intestinal tract in ruminant and pre-ruminant animals. Rumen microbial metabolism, growth and degradation of feed components.

Forage production:

Principles of the production of grass, grass silage, maize silage, whole-crop wheat and legumes. Factors influencing forage nutritive content (e.g. variety, maturity, chop length etc). Ensiling process and factors influencing, including the use of silage additives. Influence of advances in plant breeding on grass and forage nutritive quality.

Feed and forage analysis:

Chemical composition and proximate analysis of grass, grass silage, maize silage, whole-crop wheat and legumes and use of near infra-red analysis. Interpretation of silage analysis reports. Concentrate feeds, common feed additives and dietary supplements.

Voluntary food intake:

Animal and feed factors that affect voluntary feed intake. Prediction of voluntary food intake according to nutritive supply from diet and animal factors, diet selection and means to improve voluntary food intake.

Feed Compounding:

Processes involved in compound feed production. Complete and complementary feeds. Receiving and cleaning, proportioning and weighing, grinding, mixing, pelleting, cooling and bagging.

Assessment strategy:

The module will be assessed by two components of equal weighting. The first will be a report based a laboratory analysis of a forage sample. Students will be expected to evaluate the results of laboratory analysis in terms of silage production methods and feeding value to the animal. The written report will be submitted and marked on-line. The second assessment will be an in class test consisted of multiple choice and short answer questions.

Module 3

Module Title:	Rationing and Feeding Systems
Module Number:	A5095
Credit Value:	15
Level:	5

Rationale and Context:

The formulation of diets and feeding strategies to meet the nutrient requirements of animals at different stages of their productive cycle requires an understanding of animal nutrient requirements and factors affecting nutrient supply from animal feeds. This module will develop in students an understanding of how animal nutrient requirements are calculated and the techniques associated with ruminant feed evaluation, together with the ability to use quantitative data in the formulation of diets and feeding strategies for different classes of ruminant livestock. It will also introduce mineral/vitamin nutrition and the metabolic consequences of nutrient deficiency or excess. This module will build on the concepts introduced in '*Ruminant Feeds and Nutrient Supply*' and the knowledge and skills gained will be developed further in '*Developments in Feeds and Feeding*'.

Intended Learning Outcomes:

1. Explain how ruminant feeds are evaluated to determine energy and protein supply.
2. Calculate animal nutrient requirements.
3. Assess ruminant diets and predict performance.
4. Formulate ruminant diets to meet energy and protein requirements at different stages of production.
5. Implement feeding strategies and systems for different classes of ruminant livestock.
6. Identify the causes, symptoms and treatment of disorders associated with nutrient deficiency or excess.

Indicative Content:

Ruminant feed evaluation: Digestibility and its measurement. Energy partition and determination of gross energy (GE), digestible energy (DE), metabolisable energy (ME) and net energy (NE). Protein degradability in the rumen and assessment of protein quality. Factors affecting digestibility.

Ruminant nutrient requirements: Factors affecting voluntary food intake (VFI). Factors affecting nutrient requirements for maintenance, activity, pregnancy, lactation, growth and wool production. Prediction of VFI using simple equations and calculation of nutrient requirements using tables.

Ration formulation and evaluation: The metabolisable energy (ME) and metabolisable protein (MP) systems, Feed into milk (FIM). Assessment of energy and protein supply and prediction of performance. Simple manual ration formulation and an introduction to ration formulation packages.

Feeding strategies and systems: Feeding strategies for dairy, suckler, growing cattle and sheep during the productive cycle. Monitoring of nutrition by body condition scoring and metabolic profiles. Forage, concentrate and succulent feeding systems.

Metabolic disorders: Metabolic role of minerals and vitamins. In particular, Ca, Mg, Cu, Zn, Se, Co, vitamins D and E. Symptoms of deficiency or excess and problems associated with the detection and correction of mineral disorders. Metabolic diseases such as hypocalcaemia, hypomagnesaemia, acidosis, ketosis and laminitis. Prevention and treatment.

Assessment strategy:

The module will be assessed by two components of equal weighting. The first will be a ration formulation/evaluation assignment submitted and marked on-line, for a ruminant animal enterprise selected by the student. The second will be an end of module test consisted of multiple choice and short answer questions.

Module 4

Module Title:	Developments in Feeds and Feeding
Module Number:	A5094
Credit Value:	15
Level:	5

Rationale and Context:

Increasing global demand for ruminant products needs to be met with a lower environmental impact, higher product quality and improved animal health and welfare. In addition, the reduced land area for food production in association with climate change will result in alternative feeds and forages for the ruminant feed industry. This module aims to provide students with up to date information on recent developments in the nutrition of ruminant livestock and how these can be applied to practical feeding situations to optimise animal performance, enhance product quality, animal health and welfare and protect the environment. This will require the application of knowledge and skills gained in the preceding 3 modules and from experience gained within the animal feed industry, and require information on legislative requirements and principles of animal feed marketing. This module will build on the concepts introduced in '*Ruminant Feeds and Nutrient Supply*' and '*Rationing and Feeding Systems*'.

Intended Learning Outcomes:

1. Evaluate recent developments in the field of ruminant nutrition and explain how they may impact on practical dairy cow, beef and sheep nutrition.
2. Identify nutritional problems and imbalances in dairy cow, beef and sheep feeding systems and devise appropriate solutions to improve feed efficiency, product quality, health and welfare.
3. Assess the impact of legislation on rationing for dairy cows, beef and sheep and apply the basic principles of marketing to the ruminant feed production industry.
4. Evaluate and mitigate the environmental impact of rationing and feeding ruminants.

Indicative Content:

Supplementation of ruminants at grass and alternative forages:

Grass growth and nutritive value, potential from grass and its measurement (including yield from home grown forage), buffer feeding and supplementation at grass. Management of high yielding cows at grass, and feeding value of alternative forages.

Nutrition to improve dairy cow health and fertility:

Indices of fertility in dairy cows and, factors influencing fertility and nutritional means to improve days to cycling, conception rate and calving interval. Practical signals of cow health.

Manipulation of milk and meat quality

Dietary factors influencing fat and protein levels in milk. Review of theories on milk fat depression and practical means and feeding strategies to manipulate milk composition. Effect of amino acid nutrition and supplementation on milk production and beef growth. Dietary factors influencing meat quality including omega-3 fatty acids, vitamin E and selenium.

Calf and heifer rearing and nutrition:

Systems of calf rearing, effects of pattern and level of feeding on animal performance and health.

Transition cow management

Physiological changes during the dry period and early lactation, energy, protein and mineral nutrition during the dry period and early lactation.

Nutrition of suckler cows and pregnant and lactating ewes

Nutrient requirements and feeding systems during the last 6 weeks of pregnancy and early lactation in ewes. Management of nutrition and body condition score in suckler cows.

Store and finishing nutrition of cattle and sheep

Nutrition of store sheep and cattle, including nutrition of animals on long keep brassicas and out wintering, intensively finished lamb and cereal beef, alternative feeds for beef finishing systems.

An introduction to the marketing of ruminant feeds, legislation and the feed industry:

Basic principles of marketing of ruminant feeds and quality assurance. Current legislation on feed use, storage and inclusion rates in ruminant diets.

Assessment strategy:

The module will be assessed by one assignment, submitted and marked on-line, that will be based on a recent development in the area of dairy cow, beef or sheep nutrition of the students choosing and of relevance to their company and industry. The report will be in the style of an article in an industry related journal such as their company magazine, Feed Compounder, Feed International, Feed Mix, Grass Farmer, International Dairy Topics (or similar).