



Further Learning Program

Handbook for AARN Members Examination Candidates

2026

Introduction

Welcome to the Handbook for AARN Members Examination Candidates. This handbook should provide you with all the information you need about sitting the AARN Members Examination.

The Examination provides AARN members with a significant opportunity for professional development and recognition of their expertise among their peers. It should also open up further opportunities for leadership roles within the ruminant nutrition sector. We therefore urge members to take the challenge and put themselves forward.

In addition to these personal benefits, the AARN Members Examination process will, over time, open up new opportunities for collaboration between ruminant nutritionists and other professionals working in the ruminant animal industries.

If this handbook leaves any questions unanswered, please contact me or another member of the AARN Committee. We would be pleased to assist you.

We hope you accept the challenge and wish you all the best with your preparation.

Dave Huggins.
AARN Chief Examiner
on behalf of the AARN Committee

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Summary

The AARN Members Examination provides ruminant nutritionists with a significant opportunity for personal professional development and recognition of their expertise among their peers. It should also open up further opportunities for leadership roles within the ruminant nutrition sector.

The Members Examination has two sections – half of the overall grade is derived from each section. Section 1 comprises two written papers of 2 hours duration each taken on the same day. Paper A examines candidates on the principles of ruminant nutrition and paper B examines applied nutrition and feeding of ruminants, as per the Syllabus (Appendix B). Two examiners independently mark these papers, unaware of the identity of each candidate until grading has been completed.

Section 2 is an oral examination taken about 3 to 4 weeks after the written section. Of 40 - 60 minutes duration, it takes the form of a discussion between two or more examiners and the candidate. Case material may be presented for discussion. For example, feed samples, feed laboratory analysis reports, diet formulations, feed budgets, or photos. The candidate will be assessed on their knowledge of nutritional principles, their ability to interpret data and provide practical recommendations, and their ability to communicate orally.

It is strongly recommended that candidates prepare for the Members Examination over a 12-18 month period. Before doing so, they should develop an effective and realistic study plan tailored to their own specific needs. They should then set time aside each and every week for some aspect of study. A detailed Syllabus (Appendix B) and a Suggested Reading List (Appendix C) are provided.

In addition to individual preparation using a personal study plan, candidates are encouraged to join the AARN Mentor Program, and also may obtain structured peer-based support during their preparation by participating in a AARN Study Group program pending participants and locations.

The award of AARN Member by Examination is conferred upon an eligible person who applies to sit the Members Examination and achieves an overall average grade of at least 70%, having also achieved at least 55% in one section (Written or Oral) AND at least 70% in the other section (Written or Oral) of the examination.

Conferring the award AARN Member by Examination entitles a current, financial, full AARN member to use the letters '**AARNe**' after their name and the AARN Member by Examination logo on their business card and stationery.

Why the AARN Members Examination program is important

The AARN Members Examination serves AARN's three objectives:

- Provide recognition of existing nutritional expertise and promote further professional development.
- Provide a forum for co-ordinated communication, discussion and interaction on issues related to the development of the ruminant livestock industries.
- Provide confidence that the nutritional information received by the Australian ruminant industries is credible.

It provides AARN members with a significant opportunity for personal professional development and recognition of their expertise among their peers. It should also open up further opportunities for leadership roles within the ruminant nutrition sector.

In addition to these personal benefits to AARN members, the AARN Members Examination process will over time open up new opportunities for collaboration between ruminant nutritionists and other professionals working in the ruminant animal industries.

What it means to be an AARN Member by Examination (AARNe)

The award of AARN Member by Examination is conferred upon an eligible person who applies to sit the Members Examination and achieves a pass mark of 70% or above as detailed in the Assessment Process (page 10).

It signifies that:

“The candidate has demonstrated a high level of competency in the field of ruminant nutrition and feeding, as would be expected of a person providing professional advice to nutritionist colleagues not similarly qualified in the principles and practice of ruminant nutrition and feeding in the Australian ruminant industries context.”

Conferring the award AARN Member by Examination entitles a current, financial, full AARN member to use the letters ‘AARNe’ after their name and use the AARN Member by Examination logo on their business card and stationery.

Who is eligible to sit the AARN Members Examination

To sit the AARN Members Examination, a person must be a current, financial, full AARN or NZARN member. This requires EITHER a tertiary qualification, e.g. BAgric, BAppSc, BSc, BVSc and at least two years full time industry experience between graduation and taking the examination OR, if no tertiary qualification, at least five years’ full-time industry experience.

Applying to sit the AARN Members Examination

The written examinations are held in September each year in a venue determined by the AARN Committee (Melbourne or a Victorian regional centre). Oral examinations are held in October each year at the same venue.

Current financial full members of the AARN wishing to sit the Members Examination must submit the Members Examination Application Form (Appendix A) by 31 December 2025.

Examination fees

Application

The Members Examination fee is A\$1,000 + GST. This fee is payable on or before 31 December 2025. The Members Examination fee has two components: an administration component and an examination component.

- The administration component is one third of the Members Examination Fee, i.e. A\$333 + GST.
- The examination component is two-thirds of the Members Examination Fee, i.e. A\$667 + GST.

The fee structure is imposed by the AARN Committee which retains the discretion to refund examination fees on medical or compassionate grounds.

Late applications for examination, accompanied by a late fee of A\$150 + GST, are accepted between 1 January and 31 March in the year of examination. No applications are accepted after the final closing date of 31 March in the year of examination.

Withdrawal

If the candidate lodges a written request to do so with the AARN Chief Examiner before 30 June 2026, they may withdraw from the examination and have the examination component (A\$667 + GST) refunded by AARN. If, however, the candidate lodges a request to withdraw between 1 July and the date of the written examination, the examination fee will be forfeited. Irrespective of when the candidate lodges a request to withdraw, the Members Examination Fee's administration component (A\$333 + GST) is forfeited.

Deferral

If the candidate wishes to defer sitting the examination once they have submitted a completed application form to AARN and paid the examination fee, they must lodge a written request to do so with the AARN Chief Examiner before 30 June in the year of examination and pay a deferral fee of A\$100 + GST. If not, they will be deemed to have withdrawn from the examination and will forfeit the Members Examination Fee. If the candidate wishes to defer sitting the examination again the following year or subsequent years, the full administration component of the Members Examination Fee (A\$333 + GST) is payable each time.

Preparing for the Examination

It is strongly recommended that candidates prepare for the AARN Members Examination over a period of at least 12 months. This preparation period can be considered as 4 phases:

1. Stocktake reference resources and develop a personal study plan (see below)
2. Compile resources and notes, section by section, as per the exam syllabus (Appendix B)
3. Summarise (6 to 2 weeks prior to written exams)
4. Swot vac. (last 2 weeks prior to written exams)

It is also strongly recommended that candidates set time aside each and every week for some aspect of study.

In addition to individual preparation using a personal study plan, candidates are offered a Mentor and may consider forming an AARN study group with other candidates.

a) Personal study plan

Before they embark on their preparation for the examination, candidates are encouraged to invest sufficient time and thought in developing an effective and realistic study plan tailored to their own specific needs.

It is suggested that the candidate writes the study plan in outline form, including a timetable with scheduled dates to begin and finish each area of study. Candidates should then refer to their study plan regularly and ensure they adhere to the timetable set.

In the final phase of their exam preparation, candidates are strongly encouraged to practise writing answers to sample exam questions under time constraints.

b) AARN Mentoring program

Upon applying to sit the AARN Member's Examination, each candidate is encouraged to seek out a Mentor. This person would be available to the candidate to provide encouragement and support with their exam preparation and give advice on request regarding:

- The scope and standard of the examination,
- Their study plan/timetable, and
- Useful sources of information such as texts and journals

In the final 2 months leading up to the exam, the Candidate may also ask their Mentor to provide feedback on their answers to practice exam questions. There is a list of previous successful exam candidates on the website that would be suitable as potential mentors. Candidates are encouraged to join the AARN mentor Program to be matched with a Mentor or approach a previous graduate themselves (Names and numbers listed on the AARN website).

c) AARN Study Group program

AARN offers a Study Group program to assist candidates in their preparation. This program is intended to:

- encourage a steady, consistent pace of learning and provide candidates with structured peer-based support as they all prepare for examination in a given year; and
- provide a learning environment that is comfortable and uncritical and allows plenty of interaction between candidates.

It is recommended that candidates forming an AARN Study Group meet at least bi-monthly throughout the preparation period. Each meeting may comprise:

- 2-3 short presentations on designated topics by designated study group members, with a 1-2 page summary, followed by questions and discussion;
- presentation of a case study based on a relevant, recent experience; and
- an example examination question attempted individually or as a group.

If candidates are interested in forming a study group, they should contact the AARN Executive Officer.

AARN will assist candidates wishing to form a study group by providing a list of items that a study group should discuss in its preliminary meeting to get off to a good start, including:

- dates and locations for meetings,
- duration and structure of meetings,
- appointment of a group co-ordinator(s),
- identification of potential guest speakers or people with special expertise who could be invited to discuss specific topics,
- ground rules for the group, e.g., respect for all participants, punctuality, etc., and
- suggestions for sourcing reading and journal articles / other resources.

Following this initial meeting, each study group must then be self-directed.

Note: Candidates are free to contact other AARN Members, except for the nominated examiners, on any aspect of study during their preparation.

Good examination technique

It may be several years since many candidates for the AARN Members Examination have taken formal examinations, so revision of examination techniques is recommended.

Here are some good written examination techniques to consider:

- Use the perusal time to read each question carefully, decide which questions you will answer and consider key points to include in each answer.
- Make a brief outline of each answer that incorporates key points, presented in a succinct and orderly manner, before answering the question in full.
- Write clearly and succinctly, using appropriate technical (rather than colloquial) terminology.
- Underline the key words in the question to help ensure you answer the question asked and use the format requested by the examiner e.g. essay form, short notes, list, etc.

Members Examination candidates are expected to demonstrate a highly professional standard of behaviour during the examination.

The Examination

The AARN Members Examination structure and assessment process have been modelled on those developed by the Australian and New Zealand College of Veterinary Scientists (ANZCVS), which have been used very effectively for many years to examine veterinarians in ruminant nutrition and many other disciplines.

Examination structure

The Members Examination has two sections – 50% of the overall grade is gained from each section:

Section 1.

Written paper A (2 hours): Principles of ruminant nutrition

Written paper B (2 hours): Applied nutrition and feeding of ruminants.

Section 2.

Oral examination (40 - 60 minutes)

Examination location

Section 1 (Written examination) and Section 2 (Oral examination) will be offered at one central venue determined by the AARN Committee (Melbourne or a Victorian regional centre), or, via Zoom if required.

Once having indicated that he or she will sit the examination, failure of a candidate to attend will be recorded as a fail except in extenuating circumstances. Exceptions will be at the discretion of the Chief Examiner.

Written Examination

Examiners from Australia and other countries may be involved in preparing the examination where appropriate. Candidates will not influence the choice of examiners.

The written examination will comprise two (2) two-hour written papers taken on the same day (Paper A and Paper B). There will be an additional 15 minutes perusal time for each paper.

- Each paper should require candidates to answer several questions.
- Questions may be essay type, a series of small parts or multiple choice, and have several sub-sections.
- A clear indication of the marks allocated to each question or subsection will be provided.

The questions in Paper A and Paper B will be based on the Syllabus (see Appendix B).

- Paper A will be designed to test knowledge and understanding of basic concepts and principles of ruminant nutrition and feeding. Paper B will address the practice and application of ruminant nutrition and feeding.
- Some choices will be provided in paper B, enabling candidates to select questions relevant to their main ruminant species of interest.
- Questions will not be biased towards any candidate's special interest.

The examiners will mark the written papers independently, unaware of the identity of each candidate. A numerical identification system will be used to maintain candidate anonymity until grading of written papers has been completed.

Examiners will then consult on each candidate's performance prior to the oral examination.

Note - The candidate must achieve a grade of at least 55% in Section 1 of the examination (the written examination) to be eligible to sit Section 2 of the examination (the oral examination). See the section on Assessment process on the next page for details.

All examination papers will be stored securely for 12 months after the examination date and then destroyed.

Oral Examination

At the oral examination, the candidate, two examiners, and possibly an observer appointed by the AARN Examination sub-committee chairperson will sit in a room together.

Candidates will not influence the choice of examiners.

The oral examination will be between 40 and 60 minutes in duration, taking the form of a discussion between the examiners and the candidate. It will usually begin with straightforward questions and progress to more challenging ones.

Case material may be presented for discussion. For example, feed samples, feed laboratory analysis reports, diet formulations, feed budgets, or photos.

The candidate will be assessed on their knowledge of nutritional principles, their ability to interpret data and provide practical recommendations, and their ability to communicate orally.

The oral examination provides an opportunity for examiners to clarify any ambiguous answers in the written papers and to better judge the candidate's depth of knowledge of the points involved. No more than 25% of the oral examination will be devoted to the written papers.

The oral examination will be recorded.

Assessment process

Written Section: The two written papers will be graded independently as a percentage by each of the examiners. The average of written paper A and written paper B will then provide the overall grade for Section 1 (the Written Section).

Oral Section: The oral examination will be graded independently as a percentage by each of the examiners. These grades will be averaged to give a single overall grade for Section 2 (the Oral Section).

The average of the overall written grade (Section 1) and the overall oral section grade (Section 2) is the candidate's combined overall final examination grade.

A written examination report for the whole examination will be completed by the examiners immediately following the Oral examination under the supervision of the AARN Examination sub-committee chairperson. It will detail whether the candidate has passed, failed, or is to be offered a Supplementary examination. In the event of a 'Fail' or 'Supplementary' result, the examiners will

provide comments which will be used to advise the candidate the reason for their failure and give guidance for resitting the examination.

As summarised in the table below, a PASS will be awarded if the candidate achieves at least 55% in one section (Written or Oral) AND at least 70% in the other section (Written or Oral) of the examination AND achieves an overall average grade of at least 70%.

Note – The candidate must achieve a grade of at least 55% in Section 1 of the examination (the written examination) to be eligible to sit Section 2 of the examination (the oral examination).

A SUPPLEMENTARY examination will be allowed in a maximum of one section (written or oral examination) if the candidate achieves at least 55% in that section AND at least 70% in the other section but achieves an overall average grade of less than 70%.

The Supplementary examination will be offered at the next examination period. To pass the Supplementary examination, the candidate must achieve at least 70%, irrespective of the grade achieved for the passed section of the original Membership examination. Candidates who do not achieve 70% in the Supplementary examination will FAIL the entire Membership examination.

The candidate will FAIL if he/she does not fulfil the conditions of a PASS or SUPPLEMENTARY examination grade.

SECTION MARK			EXAM GRADE
Either Section (Written or Oral)	Other Section (Written or Oral)	Average (Sections 1 & 2)	
≥ 55	≥ 70	≥ 70	PASS
≥ 55	≥ 70	< 70	SUPPLEMENTARY*
Candidate fails to fulfil the conditions of PASS or SUPPLEMENTARY			FAIL

* See section on page 12 for details on the Supplementary examination offered to candidates who achieve a Supplementary examination grade.

Reporting of results

The Chief Examiner will advise candidates of their results in writing within 30 days of the oral examination.

Candidates must not contact examiners before or after the examination in relation to the examination process.

An appeal process is available to unsuccessful candidates if they wish to challenge an adverse decision. See section on page 12 for details on the Appeals procedure. All enquiries should be directed to the AARN Committee.

Assistance to unsuccessful candidates

The AARN Committee will endeavour to assist unsuccessful candidates, i.e., those who sit the examination and fail to fulfil the conditions for a Pass or Supplementary examination grade, to re-sit the examination should they wish to do so.

This process will begin with an invitation to a meeting with representatives of the AARN Examination sub-committee within 30 days of release of examination results. The aim of this session is to assist the unsuccessful candidate to identify where he / she may have gone wrong, and to provide guidance on what can be done to rectify any perceived problems. The session will provide practical useful advice should the candidate wish to retake the examination.

An unsuccessful candidate may make a written request to access information as detailed below, which is intended to help identify areas of weakness or poor performance that they can address if they reattempt the Members Examination.

Subject to an unsuccessful candidate lodging a written request to the Chief Examiner within fourteen (14) days of the meeting with representatives of the AARN Examination sub-committee, the following examination information will be made available to that candidate within fourteen (14) days:

- Examiners' performance assessment criteria for all questions in the Written section of the Examination;
- The average grade for each question in the Written Papers and an overall average mark for the Oral section;
- Examiners' written comments (if any) for the Written section of the Examination. These may be general comments that pertain to the Written Section as a whole or may be specific comments addressing particular questions where the candidate's performance was unsatisfactory and
- Examiners' written comments regarding any areas of deficiency in the candidate's performance in the Oral section.

Note that candidates will not be granted access to their examination papers.

Supplementary examination

A Members Examination candidate may be offered a supplementary examination according to the conditions set down in the Assessment process (page 10).

A supplementary examination will be offered in one section of the examination only; that is either a) the written section or b) the oral section of the examination. The entire section of the examination must be completed.

The supplementary examination must be taken at the next examination period.

The Supplementary Examination Fee will be one-third (33%) of the Members Examination Fee applicable to applicants in the year the Supplementary Examination is taken.

A candidate wishing to take advantage of a supplementary examination must notify AARN in writing on or before the closing date for lodging an application to sit the Members Examination.

The Supplementary Examination will be prepared and graded in the same manner as any other Members Examination. The examiners may or may not be the same examiners as those who conducted the initial examination. The candidate must achieve at least 70% in the Supplementary Examination to pass, irrespective of the grade for the passed section of the Members Examination. Candidates who do not achieve 70% will FAIL the entire Members Examination.

These regulations are at the discretion of the Chief Examiner.

Appeals process

Dissatisfaction with the academic judgement of the examiners as expressed in grades and recommendations does not constitute grounds for an appeal. An unsuccessful candidate can only lodge an appeal if it is based on one of the following claims:

- a) Procedural irregularities in the conduct of the examination process.
- b) Circumstances existed that seriously affected the candidate's performance at the time the examination was held, e.g. a medical condition.

Candidates making an appeal based on a medical condition affecting the candidate at the time of the examination must present a medical certificate signed by a doctor or other appropriate health professional that is dated within a period ending five (5) working days after the date of the examination.

Any candidate who wishes to appeal a decision of the AARN Examination Sub-committee must do so within sixty (60) days of the date of their notification of that decision. The request for appeal must be made in writing to the AARN Admin. Officer and must include a statement of the grounds for the appeal and documentation in support of the petition. An Appeal Committee will be appointed by the AARN Committee to consider the appeal, requesting access to any relevant documents held by the Chief Examiner or the Appellant, and meet and make a decision by simple majority within thirty (30) days of its appointment. The determination of the Appeal Committee is final and absolute.

Timelines

Examinations are held biannually in the 'even' years, with the next being 2023:

1 January each year	Opening date for candidates to lodge their Members Examination Application Form for examination the following year
31 December each year	Closing date for candidates to lodge their Members Examination Application Form for examination the following year without penalty
31 March each year	Closing date for candidates to lodge their Members Examination Application Form for examination in the current year with a late fee penalty (No applications will be accepted after this date)
30 June each year	Last day to withdraw without forfeiting the entire examination fee Last day to defer with a fee penalty without forfeiting the entire examination fee
September each year	Conduct of written examinations

October the next year	Conduct of oral examinations
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Appendix A: Members Examination Application Form

Please complete this form and forward it to the AARN Admin Officer before 31 December for examination the following year.

I, (full name in block letters)

of (address in block letters)

.....

Telephone No. (....)

E-mail address

being a current financial full member of the Australian Association of Ruminant Nutrition (or New Zealand Association of Ruminant Nutritionists) hereby apply to sit the Members Examination next year.

Professional qualifications:

1. Tertiary institution..... Date

2. Tertiary institution..... Date

Present occupation:

.....

Declaration:

I declare that I fulfil all the requirements of full membership of AARN as set down in its constitution.

I have read, understood and agree to abide by all the procedures and conditions associated with the examination process as detailed in the Handbook for AARN Members Examination Candidates, including the conditions relating to contact with nominated examiners on any aspects of study during their preparation, and access to examination information following the examination.

Date Signed

Do you give permission for your name and contact details to be released to other candidates and AARN members, for the purposes of conducting AARN business? Yes / No

Email your application to admin@aarnutrition.com.au, or post the form to:

Aust. Association of Ruminant Nutrition

Attention: Executive Officer

PO Box 10

Moriac VIC 3240

Upon acceptance, the Executive Officer will issue an invoice payable via credit card over the phone or Direct Deposit

Appendix B: AARN Syllabus

The syllabus for the AARN examination, as detailed below, is an adaptation of the syllabus for the Australian and New Zealand College of Veterinary Scientists (ANZCVS) ruminant nutrition examination developed in 2003 by Dr. Mark Burgemeister with assistance from Drs. Ian Lean and Charlotte Westwood.

Sections 1 and 2 of the AARN Members Examination (i.e. the Written and Oral sections) will examine candidates in:

A. Principles of ruminant nutrition, including:

1. The physiology of digestion in the ruminant animal
2. Water nutrition
3. Energy utilisation in the ruminant animal
4. Protein metabolism and digestion in ruminants
5. Mineral, trace element and vitamin nutrition of ruminants
6. Factors influencing feed intake of ruminants
7. Neonatal nutrition and physiology
8. Principles of growth in pre-ruminants and ruminants
9. Lactational physiology
10. Feed composition and analysis and evaluation of feeds
11. Physiology of rumen (production) modifiers

B. Applied nutrition and feeding of ruminants, including:

1. Nutrient requirements for maintenance, production (milk, meat, fibre), fertility and health
2. Investigating sub-optimal herd nutrition and feeding management
3. Rearing of young stock
4. Pasture and crop growth and management
5. Fodder conservation methods
6. Use of grains and concentrates
7. Use of commodities and by-products / co-products
8. Feed purchasing
9. Diet formulation, manufacture, delivery and on-farm storage
10. On-farm feeding management
11. Client management by nutrition advisers

The examination will cover the following species and production systems:

- Dairy cattle (managed over the range of feeding systems from pasture only through pasture plus supplements to zero grazing, housed TMR system)
- Beef cattle (grazing, cropping, supplementary feeding and feedlot, and cow/calf feeding)
- Sheep (ewe nutrition and feeding, milk, wool and finished lamb production; extensive grazing situations through to feedlot, ram feeding)

AARN Syllabus in detail:

A. Principles of ruminant nutrition

1. The physiology of digestion in the ruminant animal

- 1.1. Development, structure, and function of individual compartments of ruminant digestive system
- 1.2. How standing forages are harvested by ruminants and subsequent mechanical processes.
- 1.3. Microbial catabolism of feed constituents in the rumen
 - 1.3.1. Ruminal bacteria - Broad grouping of bacteria, variation with feed types and combinations, possible disorders, and effects on the host animal
 - 1.3.2. Ruminal protozoa and impacts/importance of protozoa on digestive efficiency
 - 1.3.3. Digestion of carbohydrates by ruminal flora
 - 1.3.4. Digestion of nitrogenous compounds by ruminal flora
 - 1.3.5. Digestion of fats/oils in the rumen
 - 1.3.6. Trace and macro mineral metabolism in the gastrointestinal tract
 - 1.3.7. Production of Volatile Fatty Acids (VFAs); factors affecting VFA production
 - 1.3.8. Absorption of VFAs and other compounds through the rumen wall
 - 1.3.9. Requirements of ruminal flora for optimal and maximal function – energy, protein and trace and macro mineral, and environmental requirements
 - 1.3.10. Maintenance of optimal rumen function through optimisation of homeostatic mechanisms
- 1.4. Function of omasum and abomasum and absorption of nutrients
 - 1.4.1. VFA and water absorption in the reticulo-rumen and omasum
 - 1.4.2. Protein digestion in the abomasum
- 1.5. Function of small intestine in chemical digestion
 - 1.5.1. Absorption of individual nutrients
- 1.6. Positive benefits and potential disadvantages of microbial digestion in the ruminant versus monogastric digestive tract

2. Water nutrition

- 2.1. Water requirements of ruminants in various physiological states
- 2.2. Water quality for health and optimal productivity

3. Energy utilisation in the ruminant animal

- 3.1. Storage of energy in chemical bonds within feedstuffs
- 3.2. How 'energy' is transferred from plants to 'work' within the ruminant, including the potential losses at each transformational stage
- 3.3. How ruminal microflora provide benefit to ruminant animals
- 3.4. Metabolic/physiological adaptations required by animal due to presence of rumen
- 3.5. Metabolisable Energy system for quantifying energy in feeds
 - 3.5.1. Determination and importance of Gross Energy, Digestible Energy, and Metabolisable Energy of feeds
 - 3.5.2. Net Energy and fates within ruminant animal
- 3.6. Biochemical pathways for digestion and absorption of energy precursors – sugars, starches, fibre, fats, and oils
- 3.7. Ketosis – Pathogenesis, diagnosis, prevention, and treatment
- 3.8. Ruminal acidosis – Pathogenesis, diagnosis, prevention, and treatment

4. Protein digestion and metabolism in the ruminant animal

- 4.1. How ruminal microflora are involved in ruminal protein production
 - 4.1.1. Costs, benefits, and potential disadvantages of this system
 - 4.1.2. Interactions between microbial nitrogen production efficiency and ruminal carbohydrate digestion
- 4.2. Digestion of ruminal microflora in the small intestine
 - 4.2.1. Amino acid and protein formation, requirement, and function
- 4.3. Use of non-protein-nitrogen compounds by ruminant animals vs. 'true' protein sources
- 4.4. Essential amino acids for ruminal microflora and the ruminant animal
- 4.5. Amino acids which may limit ruminant production
- 4.6. Nitrate poisoning, Ammonia poisoning - Pathogenesis, diagnosis, prevention, and treatment

5. Mineral and vitamin nutrition of pre-ruminants and ruminants

- 5.1. Macro mineral nutrition of ruminants, including requirements, potential interactions between minerals, and deficiencies
 - 5.1.1. Calcium, phosphorus, magnesium, potassium, sodium, chloride, sulphur
- 5.2. Trace element nutrition of ruminants, including requirements, potential interactions between minerals, and deficiencies
 - 5.2.1. Cobalt, copper, selenium, zinc, iron, iodine, manganese, molybdenum
 - 5.2.2. Sources of trace elements – inorganic and organic
- 5.3. Vitamin nutrition of ruminants, including requirements, potential interactions between minerals and trace elements, and deficiencies
 - 5.3.1. Vitamin A (β -carotene), E, D, B complex
 - 5.3.2. Importance of correct supplementation of pre-ruminants
- 5.4. Diagnosis of deficiency, nutritional requirements, and supplementation (requirements, methods of supplementation)

- 5.5. Knowledge of interactions and relationships between vitamins and minerals
- 5.6. Milk fever, grass tetany, hypophosphataemia, copper deficiency, cobalt deficiency, selenium deficiency, zinc deficiency, copper toxicity, etc. - Pathogenesis, diagnosis, prevention, and treatment

6. Factors influencing feed intake of ruminants

- 6.1. Feed factors
 - 6.1.1. 'Palatability'
 - 6.1.2. Chemical and physical form of feeds
 - 6.1.2.1. Particle size, dry matter, feed delivery, storage conditions
 - 6.1.2.2. Contamination (moulds, mycotoxins, pests, weeds)
 - 6.1.3. Water intake
- 6.2. Environmental factors
 - 6.2.1. Farm management factors that may influence feed intake
 - 6.2.2. Housing, weather
- 6.3. Animal factors
 - 6.3.1. Age, disease, lactation, productive state
- 6.4. Neuro-physiological control and drive of appetite
 - 6.4.1. Hepatic oxidation theory
 - 6.4.2. Ruminal distension
- 6.5. Animal health factors and disorders influencing feed intake
 - 6.5.1. Diagnosis, control and management of these disorders

7. Neonatal nutrition and physiology of ruminants

- 7.1. Nutrient requirements of the foetus *in-utero* and metabolism within the foetus
- 7.2. Colostrum feeding of newborn ruminants
 - 7.2.1. Nutrient components of colostrum
 - 7.2.2. 'Passive transfer' and diagnosis of failure of Passive transfer
 - 7.2.3. Production, storage and feeding of colostrum (colostrum management)
- 7.3. Digestion in the neonatal ruminant and transitional development from neonate to functioning ruminant

8. Principles of growth in pre-ruminants and ruminants

- 8.1.1. Growth of different body components throughout life of ruminant
- 8.1.2. Muscle and meat quality and growth
- 8.1.3. Feeding for improved meat production and quality
- 8.1.4. Use of growth promoting hormones, antibiotics and other compounds to influence animal growth

9. Lactational physiology

- 9.1.1. Biological adaptations associated with the change from non-lactating to lactating state
- 9.1.2. Driving mechanisms, including hormonal control pathways
- 9.1.3. Potential risks of lactation and nutritional management of the lactating ruminant
 - 9.1.3.1. Disease risks
 - 9.1.3.2. Effects of lactation on homeostatic control mechanisms

10. Feed composition and analysis and evaluation of feeds

- 10.1. Methods of quantitatively analysing and evaluating feeds for ruminants
 - 10.1.1. Measuring (in theory and in practice) different parameters of importance to ruminant nutrition, including Dry Matter, Digestibility, Metabolisable Energy, Crude protein, 'fibre fractions'
 - 10.1.2. Analytical methods used by feed laboratories (e.g., Wet chemistry methods, Near Infrared Reflectance (NIR), Van Soest digestion)
 - 10.1.3. Interpretation of feed laboratory reports (nutritional quality, suitability for different animal classes/purposes)
- 10.2. Knowledge of uses and limitations of present (commonly used) quantitative assessments
- 10.3. Methods for obtaining representative samples of different types of feeds for analysis
- 10.4. Other methods of assessing/differentiating feeds

11. The physiology of rumen (production) modifiers

- 11.1. The use of compounds that influence the ruminal microflora in ruminant production – rumen modifiers, yeasts, yeast metabolites, other compounds
- 11.2. The modification and management of the balance of the organisms within the rumen
- 11.3. Advantages and disadvantages/limitations of rumen modifiers
- 11.4. Importance of registered claims and how they influence advice; Prescription only medication (POM) products and who can/can not legally prescribe

B. Applied nutrition of ruminants

1. Nutrient requirements for production, fertility, and health

- 1.1. Feeding for production
 - 1.1.1. The optimisation of nutrient supply to promote optimal production – economic and physiological
 - 1.1.2. Ruminant nutrient requirements for specific types of production (e.g., milk, wool, weaner growth)
 - 1.1.3. Economic constraints and objectives in different enterprises and markets
 - 1.1.4. Assessing levels of production
 - 1.1.5. Feeding management at different points in the 'productive cycle'
- 1.2. Nutrition and reproduction
 - 1.2.1. Ways in which nutritional management may influence reproductive function and performance
 - 1.2.2. Animal health requirements

1.2.3. Major nutrient requirements for optimal reproductive performance

1.2.3.1. Energy, protein, trace minerals and vitamins

1.2.4. Nutritional requirements for health versus requirements for reproduction

2. Assessing sub-optimal nutrition and feeding management

2.1. Assessment of a group of ruminants

2.1.1. Use of herd records, observations

2.2. Assessment of the farm as a whole

2.2.1. Use of farm records

2.3. Conditions which lead to inadequate nutrition of ruminants

2.4. Detection of nutritional deficiencies

2.4.1. The effects of diet on immune function

2.4.2. Cost-effective means of detection, confirmatory diagnosis, treatment and correction of nutritional deficiencies and feed management problems

3. Rearing of young stock

3.1. Influence of maternal nutrition; pre-, peri- and post-parturition

3.2. Nutrition and management of the new-born

3.3. Feeding systems for pre-ruminants

3.4. Environment and housing for pre-ruminants

3.5. Husbandry and disease control for pre-ruminants

3.6. The weaning process

4. Pasture and crop growth and management

4.1. Common pastures, conserved forages and forage crops fed to ruminants in Australia and New Zealand

4.1.1. Perennial, short-term and hybrid ryegrasses

4.1.2. Perennial and short-term legumes (*e.g.* clovers, lucerne)

4.1.3. Cereals (including maize) for conserved fodder and grain

4.1.4. Grasses for fodder (*e.g.*, *Phalaris*, *Paspalum*, millets, Sudan grasses, sorghum)

4.1.5. Other forage and grazing plants grown for ruminants

4.2. Grazing management

4.2.1. Effects of grazing management on whole farm performance

4.2.2. Assessing and measuring pasture growth and production

4.2.2.1. Different methods of measuring pasture consumption (*e.g.* Directly via rising plate, dry matter cuts, visual, or scanners, and indirectly via back-calculation)

4.2.3. Managing pastures and crops for optimal farm versus animal performance

4.3. Soil fertility management

- 4.3.1. Major nutrients (phosphorus, nitrogen, potassium, and sulphur)
- 4.3.2. Potential of toxicity to ruminants or creation of mineral deficiencies through nutrient applications to pasture or crops
 - 4.3.2.1. Bloat
 - 4.3.2.2. Mineral and trace element deficiencies
 - 4.3.2.3. Cyanic acid
 - 4.3.2.4. Nitrate and nitrite
 - 4.3.2.5. Fungal, mould and aflatoxin contamination
- 4.3.3. Nutritional limitations and imbalances that constrain the use of some pastures, forages, crops and grains

5. Pasture and crop conservation methods

- 5.1.1. Costs and benefits of different methods of feed conservation
- 5.1.2. Hay production - fundamentals and options
- 5.1.3. Silage production - fundamentals and options (Pit, bale, bunker)
- 5.1.4. Use of aids when conserving forage (inoculants, acids, molasses etc.)
- 5.1.5. Potential hazards and risks associated with forage conservation with respect to whole farm performance

6. Use of grains and concentrates in ruminant diets

- 6.1. Different grain processing methods used, including steeping, rolling/ hammer milling, steam flaking, pelletising, expanding, and expelling
- 6.2. Effects of grain choice and processing method on rate and extent of ruminal starch digestion, rate of starch passage and total starch digestibility in different feeding systems
- 6.3. Optimising utilisation of grains by ruminants, costs and problems. Managing these problems and deficiencies.

7. Use of commodity and by-product feeds in ruminant diets

- 7.1. Evaluation of the constituents and performance of the range of co-products, by-products and 'waste' feeds commonly available for use in ruminant diets
 - 7.1.1. How they could/should be profitably utilised by ruminant animals
 - 7.1.2. Potential for dietary disturbance or toxicity and limitations to use of these feeds, including potential chemical residue risks
 - 7.1.3. Storage issues, including potential spoilage and contamination

8. Feed purchasing

- 8.1. Feed budgeting methods
- 8.2. Valuing feeds on nutrient basis: energy, protein, relative value (dry matter, energy and protein), optimisation
- 8.3. Strategies to manage quality risk when buying feed
- 8.4. Strategies to manage supply risk when buying feed
- 8.5. Strategies to manage price risk when buying feed

9. Diet formulation, manufacture, delivery, and on-farm storage

9.1. Formulation of diets to meet desired nutrient specifications

9.1.1. Dietary energy

9.1.2. Dietary fibre requirement, methods of assessing 'fibre' provision

9.1.3. Dietary protein

9.1.4. Macro minerals, trace elements and vitamins

9.1.5. Use and requirements of feed additives

9.1.5.1. Rumen (production) modifiers

9.1.5.2. Buffers and alkalising agents

9.1.5.3. Other additives

9.1.6. Toxicity and restraints regarding the use of some feeds for ruminants

9.2. Stockfeed manufacture

9.2.1. Grain processing

9.2.2. Process for manufacturing mash feeds, pellets, and concentrates

9.2.3. Quality assurance programs used by stockfeed manufacturers

9.2.4. Regulatory environment stockfeed manufacturers operate in

9.3. Feed storage

9.3.1. Appropriate conditions for storing fodder, grains/concentrates and by-products

9.3.2. Risks – spoilage and contamination

10. On-farm feeding management

10.1. Grazing management for optimal ruminant production

10.2. Integration of forages and grains/concentrates and other feeds in ruminant diets

10.3. Management of feed delivery to animals via dairy bail feeding systems, open troughs, feed pads, etc.

10.3.1. Infrastructure and equipment required

10.3.2. Key success factors

10.4. Optimising feed use efficiency, ruminant production and animal health

11. Client management by nutrition advisers

11.1. Determining the client's goals

11.2. Managing conflict

11.3. Signposting clients to resources and tools

11.4. Referring clients to other professionals

11.5. Ethical conduct – confidentiality, etc.

Appendix C: Learning resources

This appendix includes lists of the following learning resources that should assist AARN examination candidates in their preparation:

- Recommended reference books
 - Must have books (therefore worth buying your own copy)
 - Books worth borrowing from a library
- Book retailers from which these books may be purchased
- Websites
- Email subscriptions
- Technical subscriptions
- Magazine subscriptions
- Podcasts/webinars
- Social media
- Apps

Note –

These lists of resources are by no means complete and are ever-evolving. So, if you find other useful resources, we would appreciate it if you could inform AARN's Executive Officer so we can update the list. admin@aarnutrition.com.au

Recommended reference books

a) Must have books (therefore worth buying your own copy):

- Feeding the Dairy Cow - Chamberlain A. & Wilkinson J. (1996). Reprinted 2010) (Chalcombe Publications)
 - A little dated, but provides a very good overview with excellent diagrams
 - Contains useful exercises and tables
 - Available from The Rural Store, Amazon (US), and other retailers. Expect to pay approx. \$100 plus postage
- Feeding Concentrates – Supplements for Dairy Cows (Revised Edition) Kellaway R. & Harrington T. (2004). (Landlinks Press)
 - A little dated, but provides a very good overview
 - Can browse on CSIRO Publishing website using Google Preview
 - Available from The Rural Store, Amazon (US), other retailers. Expect to pay approx. \$50 plus postage
- Nutrient Requirements of Domesticated Ruminants - Primary Industries Standing Committee (2007). (CSIRO Publishing)
 - Is an update of the benchmark publication, 'Feeding Standards for Australian Livestock: Ruminants', published in 1990
 - Applicable to grazing animals, providing a systematic approach to requirements for maintenance, wool growth and weight change
 - Can browse on CSIRO Publishing website using Google Preview
 - Available from The Rural Store, other retailers. Expect to pay approx. \$XXX plus postage

Depending on your main ruminant species of interest, either:

- Nutrient Requirements of Dairy Cattle 7th Edition (2001). (National Academy Press)
 - Available from The Rural Store, Amazon (US), other retailers. Expect to pay approx. \$135 plus postage
 - Note – New edition of this publication is expected to be available later in 2016.
- OR
- Nutrient Requirements of Beef 7th Edition (Update) (2000). (National Academy Press)
 - Available from The Rural Store, Amazon (US), other retailers. Expect to pay approx. \$85 plus postage
- OR
- Nutrient Requirements of Small Ruminants: Sheep, Goats, Cervids, and New World Camelids (2007). (National Academy Press)
 - This publication updates the previous Sheep (1985) and Goats (1981) publications
 - Available from The Rural Store, Amazon (US), other retailers. Expect to pay approx. \$200 plus postage
- Large Dairy Herd Management (3rd ed., e-book) published by The ADSA® (American Dairy Science Association) Foundation
 - The e-book includes 97 chapters in 15 sections. This third edition is fully updated and includes numerous colour figures, video, and separate metric and imperial versions – a must-have resource.

b) Books worth borrowing from a library:

General

- Nutritional Ecology of the Ruminant – Van Soest P.J. (1994). (Comstock Books)
 - Classic text on ruminant nutrition. Despite many advances in knowledge over the past 20+ years, many of the basic models, simple mathematical equations, and fundamentals explained in this text remain largely unchanged
 - Available from The Rural Store, Amazon (US), other retailers. Expect to pay approx. \$150 plus postage
- The Ruminant Animal: Digestive Physiology and Nutrition – Church D.C. (1993). (Waveland Press)
 - Provides good descriptions of the mechanism of nutrient utilisation as well as nutrient requirements

- Many photographs, diagrams, and tables
- Available from The Rural Store, Amazon (US), other retailers. Expect to pay approx. \$120 plus postage
- Mineral Nutrition of Livestock (4th Edition) – Suttle N. (2010). (CABI Publishing)
 - Excellent book covering new advances in livestock mineral nutrition
 - Also covers environmental and human health implications
 - Available from The Rural Store, Amazon (US), other retailers. Expect to pay approx. \$230 plus postage
- Successful Silage (Top Fodder Silage Manual) – Kaiser A. et al et al (editors) (2006) (NSW DPI)
 - Comprehensive text on silage making in Australia
 - Separate chapters can be downloaded as PDFs from Dairy Australia website
 - Available from NSW DPI. Expect to pay approx. \$75 plus postage

Dairy-specific

- Australasian Dairy Science Symposium 2014 proceedings
 - Wide range of themes and topics, including Nutrition and Animal Health
 - Individual papers or entire proceedings can be downloaded as PDFs from www.adssymposium.com.au
- Australasian Dairy Science Symposium 2012 proceedings
 - Wide range of themes and topics, including Feedbase and Nutrition
 - Out of print
- Australasian Dairy Science Symposium 2010 proceedings
 - Wide range of themes and topics, including Dairy Production Systems and Forage Production and Animal Response
 - Out of print
- Australasian Dairy Science Symposium 2007 proceedings
 - Wide range of themes and topics
 - Out of print
- The Development, Nutrition, and Management of the Young Calf – Davis C. & Drackley J. (1998). (Iowa State Press)
 - Quite old now but still an excellent overview of calf nutrition, including milk and milk replacer nutrition and calf meals etc.
 - Available from The Rural Store other retailers. Expect to pay approx. \$160 plus postage
- Pasture and supplements for grazing animals – Rattray R.V. et al. (2007). (NZ Society of Animal Production)
 - Good overview of pasture nutrition and forage crops for ruminants
 - Available from The Rural Store, other retailers. Expect to pay approx. \$80 plus postage
- Milk Production from Pastures – Holmes C. et al. (2002). (Massey University)
 - Good basic text with two main sections covering the principles and the practices of milk production from pasture
 - Available from The Rural Store, other retailers. Expect to pay approx. \$120 plus postage
- Feedpads for Grazing Dairy Cows – Moran J. & McDonald S. (2010). (CSIRO Publishing)
 - Includes information on physical aspects of feedpad design, feeding management of PMRs and animal health issues related to feedpads
 - Can browse on CSIRO Publishing website using Google Preview
 - Available from The Rural Store, CSIRO Publishing, other retailers. Expect to pay approx. \$50 plus postage
- Ruminant Acidosis - aetiopathogenesis, prevention and treatment – Lean I. et al. (2007). (Aust. Vet. Assoc / Dairy Australia).
 - Detailed summary based on comprehensive literature review by RAGFAR. Discusses dairy cattle, feedlot beef cattle and sheep.
 - Can be downloaded from Dairy Australia website

- Out of print

The Rural Store has an extensive list of other reference books on dairy production which may also be of interest.

Go to www.theruralstore.com.au/PriceLists/Cattle.html

Beef-specific

- Beef Cattle Production and Trade – Cottle D. & Khan L. (editors) (2014). (CSIRO Publishing)
 - Comprehensive international text with an emphasis on northern and southern Australian beef production
 - Provides detailed information on production systems and animal husbandry, and includes case studies
 - Can browse on CSIRO Publishing website using Google Preview
 - Available from The Rural Store, CSIRO Publishing, other retailers. Expect to pay approx. \$140 plus postage

The Rural Store has an extensive list of other reference books on beef production which may also be of interest.

Go to www.theruralstore.com.au/PriceLists/Cattle.html

Sheep-specific

- Sheep Farming for Meat and Wool – Court J., Hides S. & Webb-Ware J. (2010). (CSIRO Publishing)
 - Provides practical, up-to-date information on sheep production and management
 - Is based on research and extension projects conducted over many years by the DEDJTR and its predecessors and the University of Melbourne
 - Available from The Rural Store, CSIRO Publishing, other retailers. Expect to pay approx. \$50 plus postage
- Sheep nutrition – Freer M. & Dove H. (2002). (CABI Publishing)
 - Main emphasis is on sheep grazing in systems that range from intensively utilised sown pastures to extensive rangelands
 - Can browse on Google Books using Google Preview
 - Out of print

The Rural Store has an extensive list of other reference books on sheep production, which may also be of interest.

Go to www.theruralstore.com.au/PriceLists/Sheep.html

Note –

- This is by no means a complete list of reference books. There are many others available that you may also find useful.
- Purchase prices for books may vary considerably between online sites and bookstores

Book retailers

Book retailers from which these books may be purchased include:

- **The Rural Store** (“The one-stop agricultural bookshop”)
 - Based near Melbourne
 - Can source most books on request, offering a worldwide special order service
 - Titles available as hard copies only
 - Order by phone or email, pay by credit card
 - Contact details:
 - Ph. 03 9873 7202
 - Email: theruralstore@bigpond.com
 - Website: www.theruralstore.com.au/
- **CSIRO Publishing**
 - Search the website for available titles

- Order online, pay by credit card
- Contact details:
 - Website: www.publish.csiro.au/
- **The Co-op**
 - Online store of co-operative, which has over 60 stores across Australia (many on university and TAFE campuses)
 - Member discounts provided (\$25 lifetime membership fee applies)
 - Search the website for available titles
 - Some titles available as eBooks
 - Order online, pay by credit card
 - Contact details:
 - Website: www.coop.com.au/textbook/search/
- **Amazon (US)**
 - Search the website for available titles
 - Some titles available as eBooks
 - Order online, pay by credit card
 - Contact details:
 - Website: www.amazon.com
- **Google Books**
 - Search the website for available titles
 - Some titles available as eBooks
 - Order online, pay by credit card
 - Contact details:
 - Website: www.books.google.com.au/

Websites

Websites with useful resources include:

- AARN Members Area www.aarnutrition.com.au
- Meat & Livestock Australia www.mla.com.au
- Dairy Australia www.dairyaustralia.com.au
- DEDJTR-Vic www.agriculture.vic.gov.au
- NSW DPI www.dpi.nsw.gov.au/agriculture
- Qld. Dept. of Ag www.daf.qld.gov.au/animal-industries
- Qld Dairy www.dairyinfo.biz/
- Google Scholar www.scholar.google.com.au
- Dairy NZ www.dairynz.co.nz/
- Animal Health Australia www.animalhealthaustralia.com.au
- Cornell University <http://prodairy.cals.cornell.edu/>
- Penn State Extension www.extension.psu.edu/animals
- University of Wisconsin www.dairymgt.info/
- University of Illinois Livestock Trail www.livestocktrail.illinois.edu/
- University of Missouri www.agebb.missouri.edu/dairy/feed/index.htm
- DeLaval Milk Production.com www.milkproduction.com/
- Calf Notes www.calfnotes.com
- Feedstuffs www.feedstuffs.com

Email subscriptions

- Meat & Livestock Australia www.mla.com.au
 - Subscribe to receive the latest key market news, developments and industry events (Beef, sheep and goats)
 - E-newsletters and email alerts available to MLA members and non-members
 - Some non-member e-newsletters have costs associated with the subscription
- Dairy Australia www.dairyaustralia.com.au
 - Subscribe to receive the latest information on:
 - Numerous animal performance topics, including Feedbase and Animal Nutrition
 - Prices, stats and markets
- Hoards Dairyman Intel www.hoards.com/Intel
 - Subscribe to receive a free weekly E-newsletter:
 - Latest US dairy industry news
 - Best of the week's online blogs and conversations
- Cornell University www.pro dairy.cals.cornell.edu/
 - Subscribe to receive the Pro-Dairy e-Leader Newsletter and news and events related to dairy nutrition, dairy farm management, and development of the CNCPS model
- Dairy Globe Newsletter www.freshagenda.com.au/
 - Subscribe to receive free monthly 'Horizons' e-newsletter
 - Dairyglobe, a weekly report summarising major events in domestic and world dairy markets, is also available. An annual subscription fee applies
- Global Trade www.globaldairytrade.info/
 - Subscribe to receive updates on milk trade prices fortnightly
- Profarmer www.profarmer.com.au
 - Subscribe to grain and wool market newsletters
 - Annual subscription fee applies
- Dairy News Australia www.dairynewsaustralia.com.au/
 - Subscribe to a free weekly e-newsletter for industry news

Technical subscriptions

- Elsevier journal alerts <https://secure.jbs.elsevierhealth.com/action/registration?code=jods-site>
 - List of all newly published papers in the Journal of Dairy Science. Abstracts can be downloaded free
 - Some full papers available for free
- Searchable Proceedings of Animal Conferences (S-PAC) <https://spac.adsa.org/index.asp>
 - Annual subscription fee US\$150
 - Papers from over 50 dairy conferences and 500 proceedings can be downloaded (the database continually gets bigger)

Magazine subscriptions

- International Meat Topics magazine and International Dairy Topics magazine www.positiveaction.info/
 - Paid subscription to receive each edition
 - Free access to key articles in past editions of magazines
- Australian Dairy Farmer www.australiandairyfarmers.com.au/magazine
 - Paid subscription to receive each edition
 - Free access to past editions of the magazine (> 6 months ago)
- Australian Lot Feeders Association www.feedlots.com.au/

- Membership and magazine subscription
- Hoards Dairyman www.hoards.com
 - Paid subscription to receive each edition

Podcasts/webinars

- Dairy Australia www.dairyaustralia.com.au/People-and-skills/Education-and-careers/Webinars/Farm-based-webinars.aspx
- Future Beef www.futurebeef.com.au/
- Hoards Dairyman www.hoards.com/webinars
- AHDB (UK) www.dairy.ahdb.org.uk/
- Feedstuffs www.feedstuffs.com/podcasts.aspx?c=20&cn=Feedstuffs%20In%20Focus
- ABC Rural www.abc.net.au/news/rural/

Social media

LinkedIn

- Dairy Herd Management
- Dairy News Australia
- Dairy Calf & Heifer Association
- Progressive Dairyman
- Australian Lot Feeders Association
- Dairy Australia
- Meat & Livestock Australia
- Beef Central
- Future Beef
- Dairy CRC and Sheep CRC

Blogs

- Dairy Fertility Investigator (Dr EeCheng Ooi, DEDJTR) www.dairyfertility.com.au/
- Beef Magazine US www.beefmagazine.com/sectors/feedlots

Apps

- Dairy Australia
 - Body Condition Scoring
 - Mastitis
- Meat & Livestock Australia
 - Latest News and Reports
- Zinpro
 - Digital Dermatitis
 - Step up
 - First Step

Note –

These lists of resources are by no means complete and are ever evolving. So if you find other useful resources we would appreciate it if you could inform AARN's Executive Officer so we can update the list.
admin@aarnutrition.com.au

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