

**Current status of faecal NIRS
in delivering benefits
to northern beef producers**

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What is faecal NIRS?

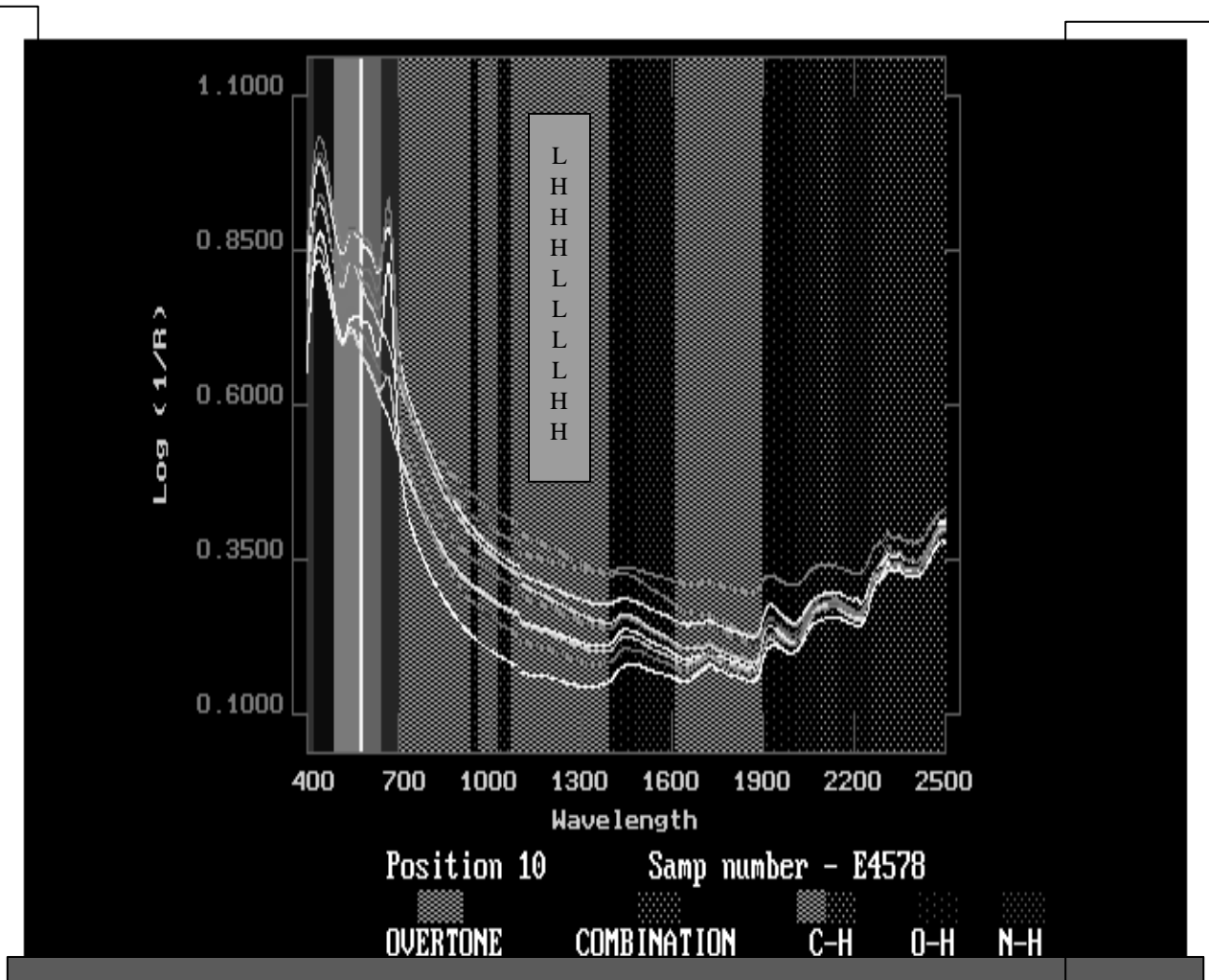
NIRS: near infrared reflectance spectroscopy

Near infrared radiation: between visible light and infrared

Reflectance:

- depends on the chemical bonds
- energy absorbed or reflected
- measure diffuse reflectance wavelength by wavelength (400 - 2500 nm)
- produce a reflectance spectrum

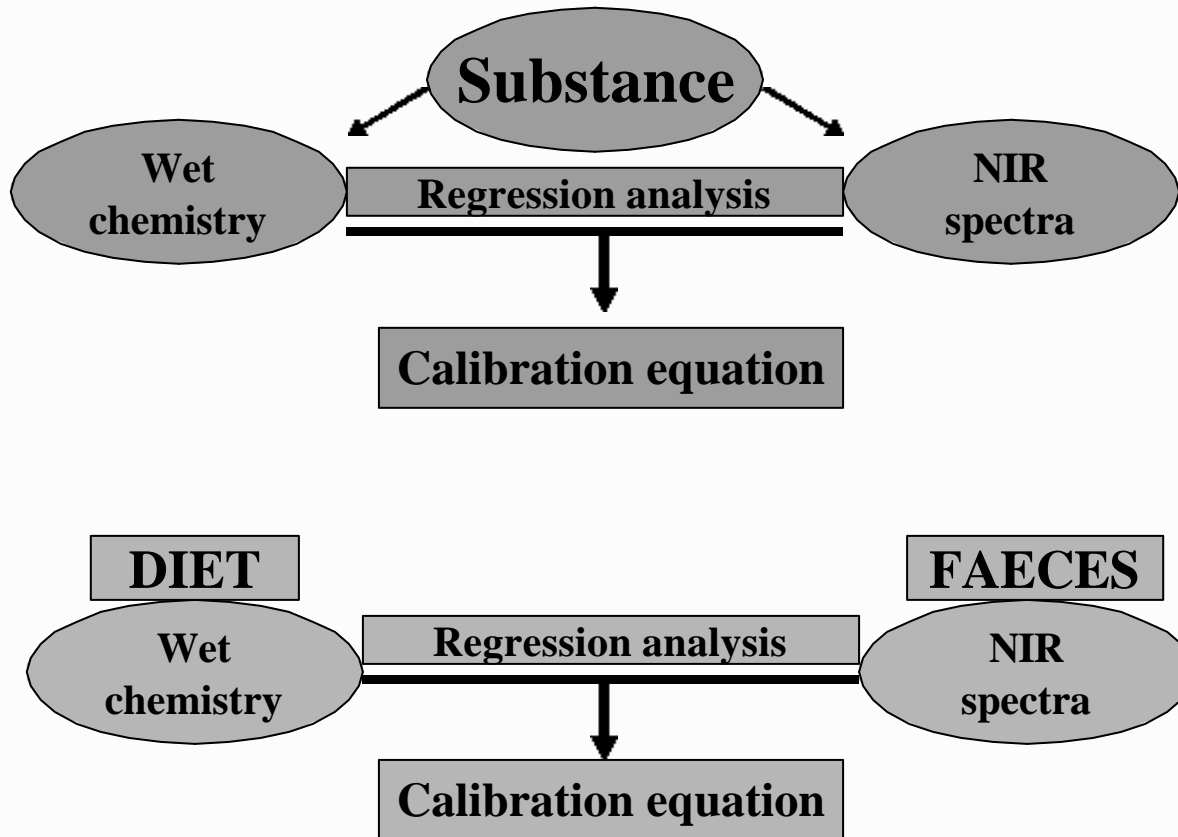
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Faecal NIR spectra representing high and low dietary N

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NIRS is a secondary method of analysis



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WHAT INFORMATION CAN FAECAL NIRS PROVIDE

Range of attributes for prediction

- **Dietary crude protein (nitrogen)**
- **Dietary digestibility (energy)**
- **Dietary non-grass proportions**
- **Faecal N concentration**
- **Growth rate**

- **Dietary NDF (energy and intake)**
- **Dietary ADF (energy)**

Diet quality and composition

Growth rate

WHY PREDICT DIET QUALITY



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WHY PREDICT GROWTH RATE

Proactive rather than reactive decision making

Distinction between measuring liveweight (cattle scales)
and estimating current growth rate

Cattle movements

(within property, between properties, to feedlot, sale)

Supplementation strategies

Forward marketing

What does it offer?

Simplicity, low cost, timeliness

Educational technology (knowledge and understanding)

animal nutrition

animal behaviour (diet selection)

year, seasonal and paddock effects

system function

Resource monitoring

land/pasture capability (potential and limitations)

forage sources and importance

year and seasonal effects

A decision support tool for management

Faecal NIRS - what does it offer today's grazer

APPLICATIONS

Tool for timely decision making

- **cost effective supplementation (when, what and how much)**
- **stock movements (paddock to paddock, paddock to feedlot)**
- **marketing backed by forward planning**
- **weaning**

APPLICATIONS

Agistment decisions

- value according to information base, past and present

Resource monitoring by faecal profiling

- accessible and affordable
- nutritional potential and limitations (land capability)
- pasture, soil, climatic (rainfall/temperature) effects
- seasonal and year effects
- pasture type effects
- dietary CP and energy - levels and ratios
- non-grass contributions to cattle diets

LIMITATIONS

Reliability of predictions

Current equations | → (always an error component)

Future equations

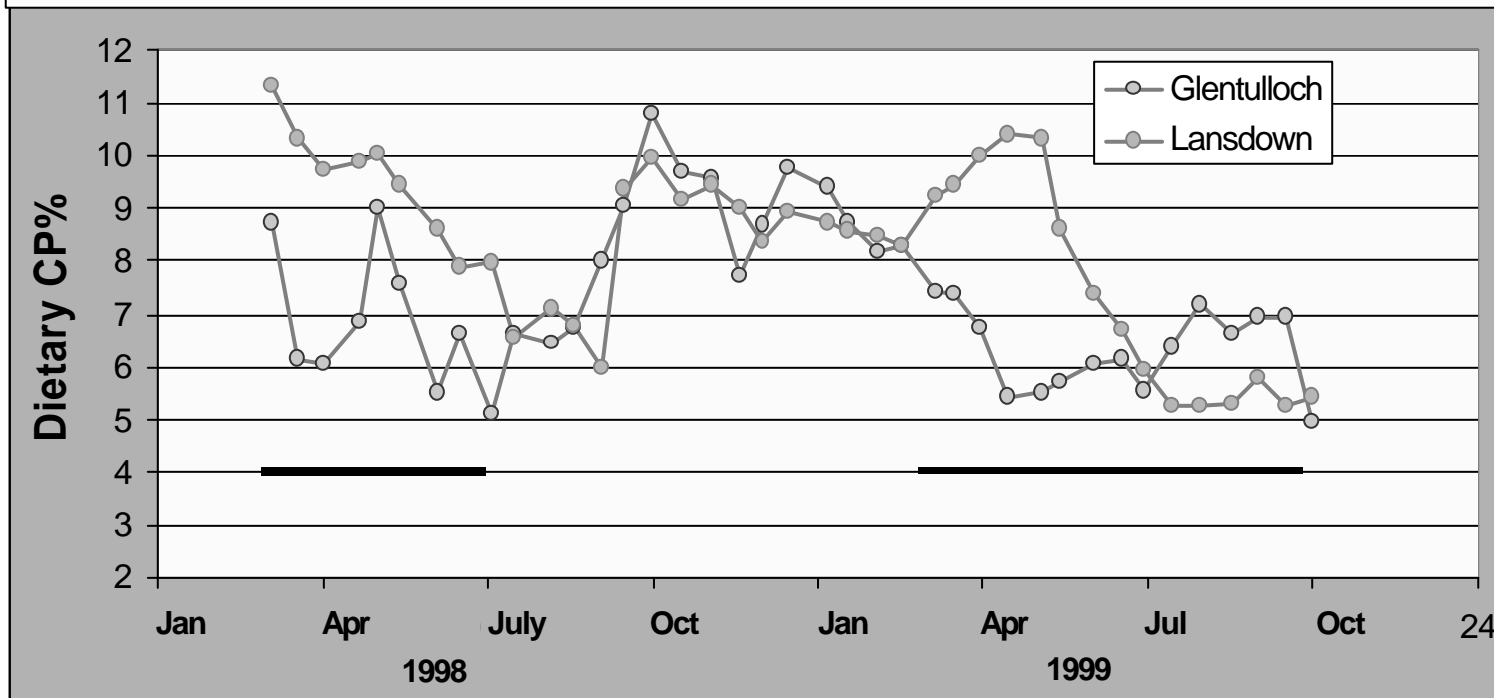
Most applications depend on other technologies

Reliable nutritional model | → (Decision support system)

Responses to supplements

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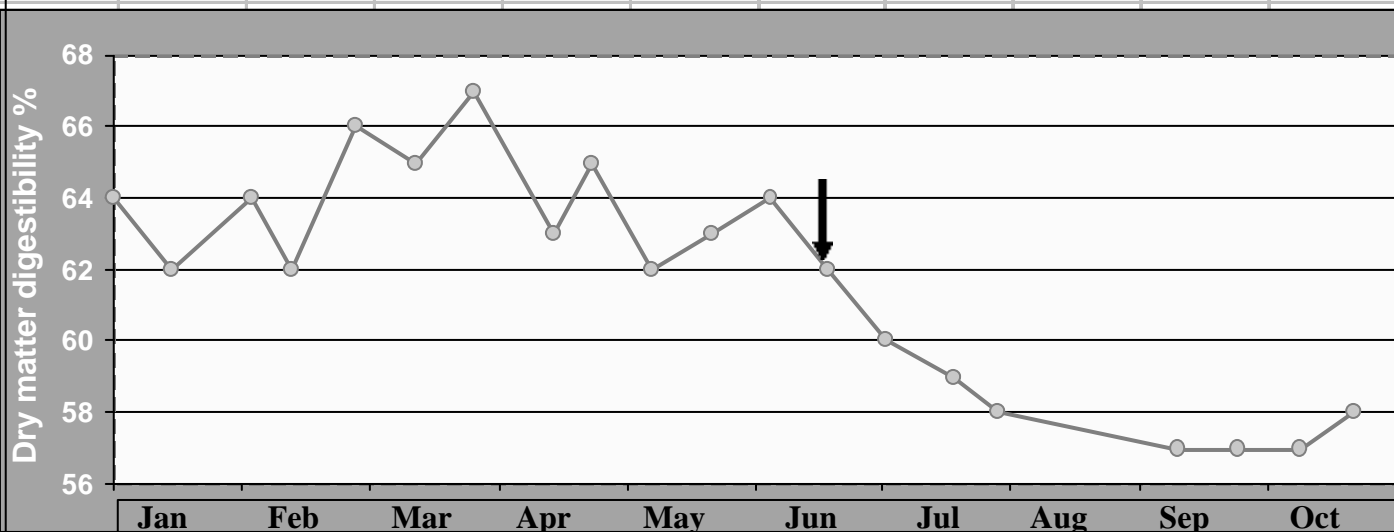
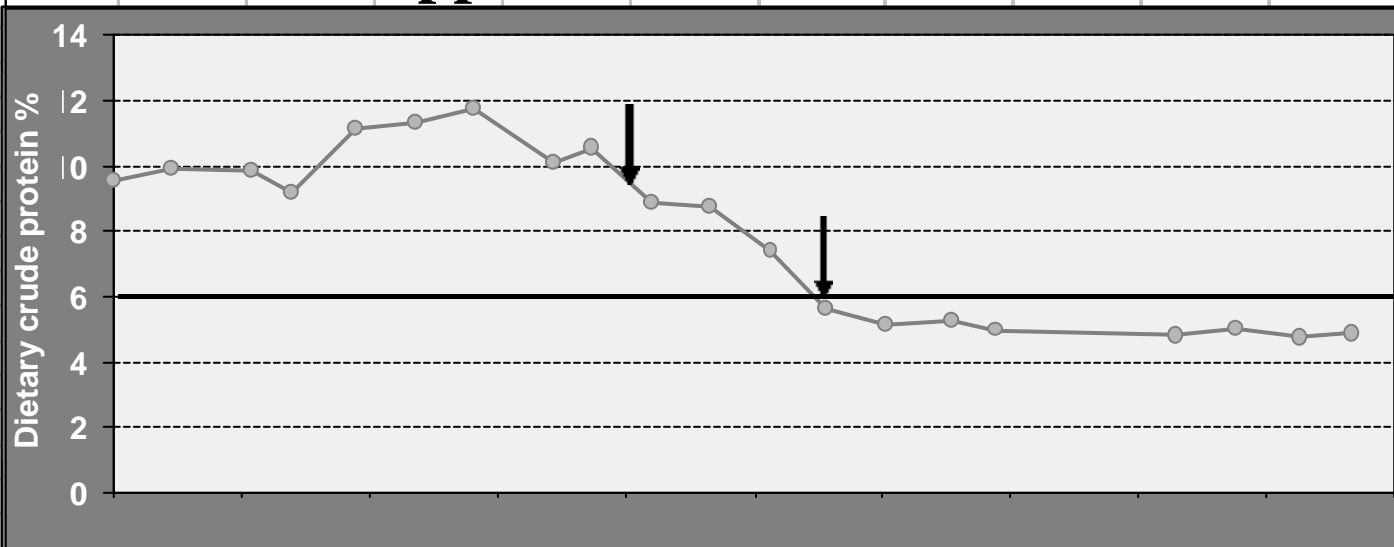
EFFECT OF PASTURE TYPE ON NUTRITION



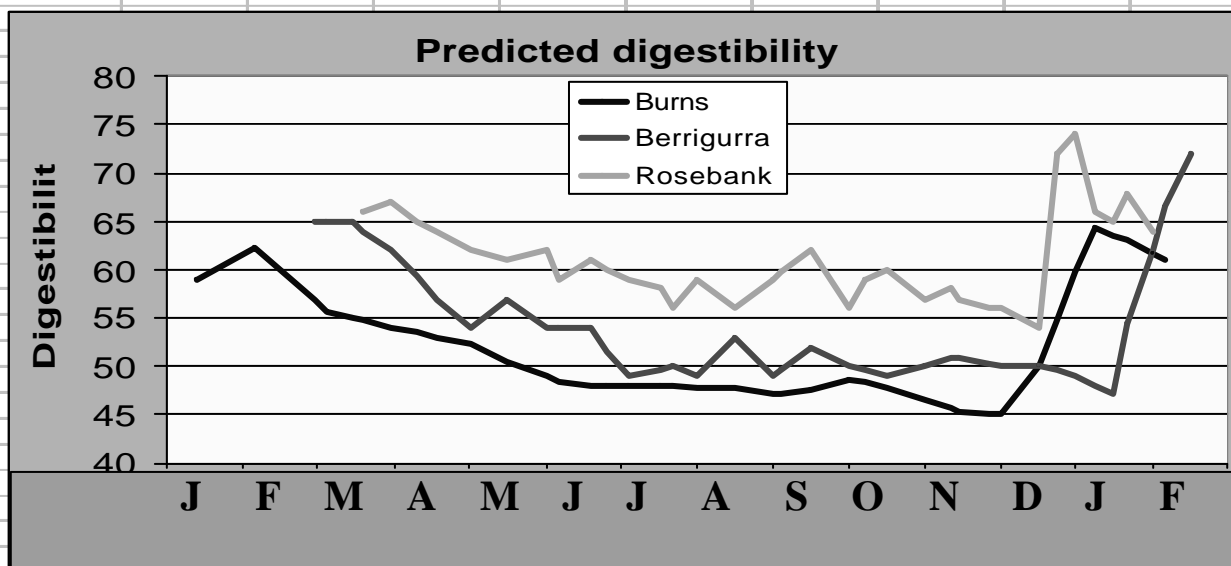
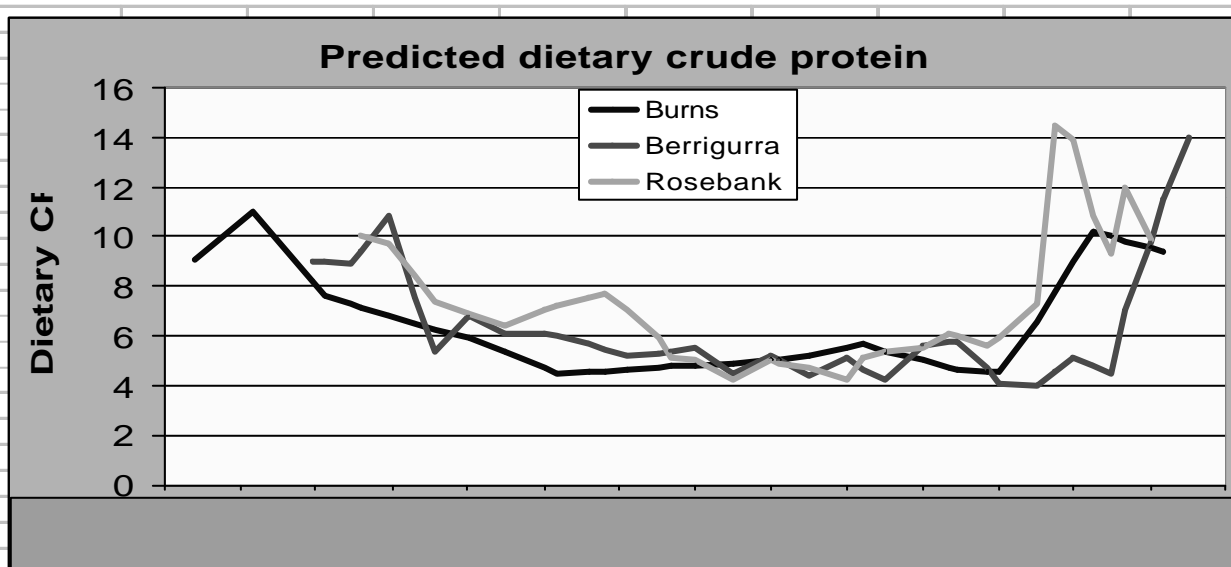
Faecal NIRS profiles of dietary crude protein levels for cattle grazing *Urochloa/stylo* pasture at Lansdown and native pasture at Glentulloch from March 1998 to September 1999

Faecal NIRS - North Queensland Beef Forum

Supplementation decisions



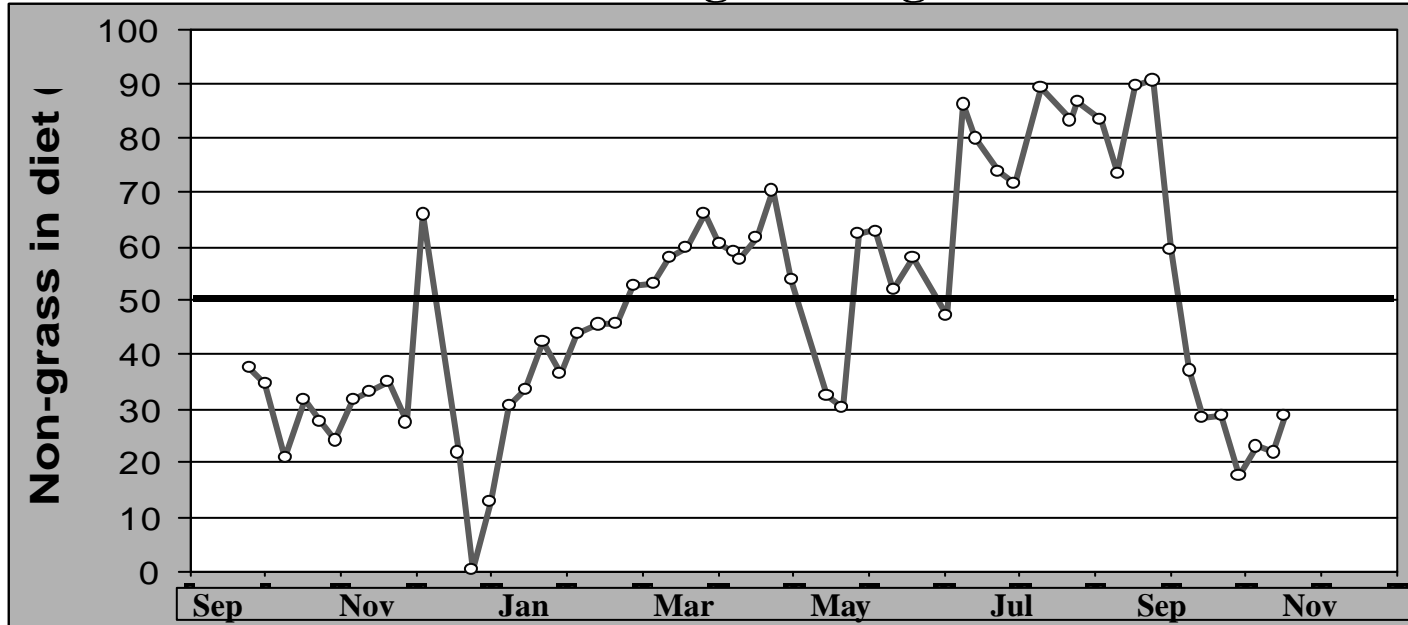
Dietary crude protein and digestibility profile of steers grazing Urochloa/stylo pasture at Lansdown in 1999



**Dietary crude protein and digestibility profiles of cattle
Grazing speargrass (Burns), buffel grass (Berrigurra)
and Mitchell grass (Rosebank) pastures**

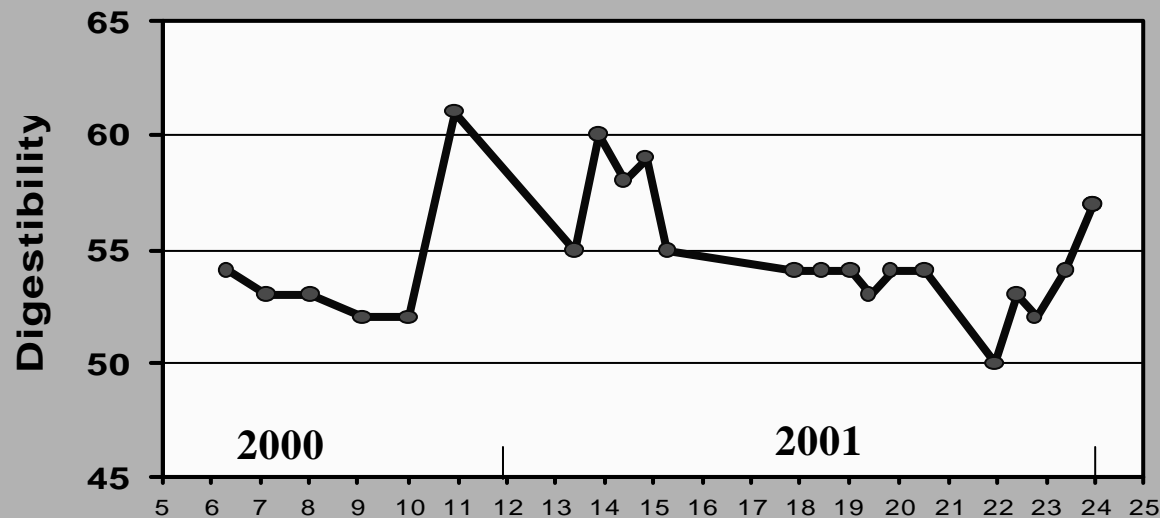
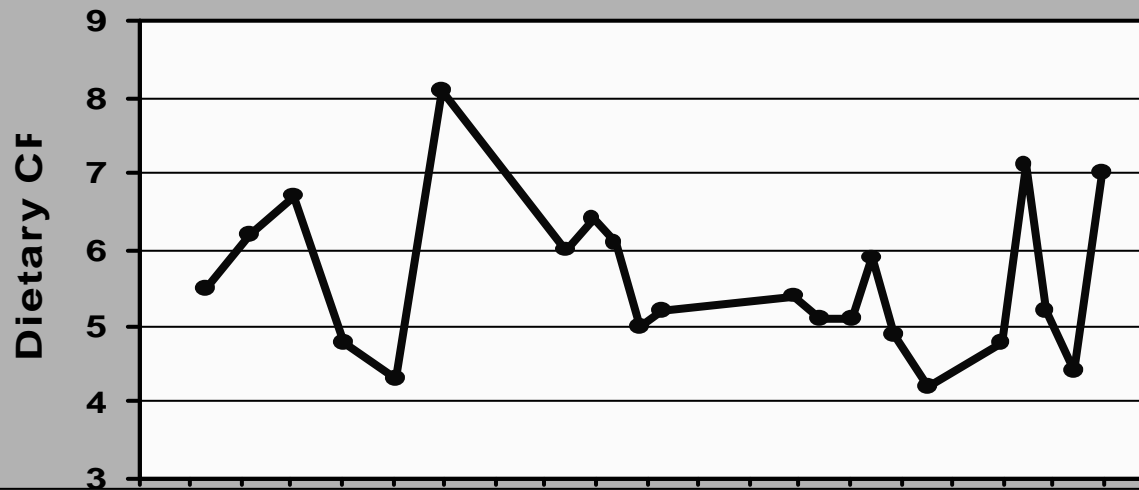
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Resource monitoring - non grass in diet



**Non-grass dietary proportions of steers at Rosebank
September 1997 to November 1998**

Diet quality profile on buffel grass pasture in cell graze system (Frankfield, Clermont)



Status of current faecal NIRS equations

Dietary crude protein

Digestibility

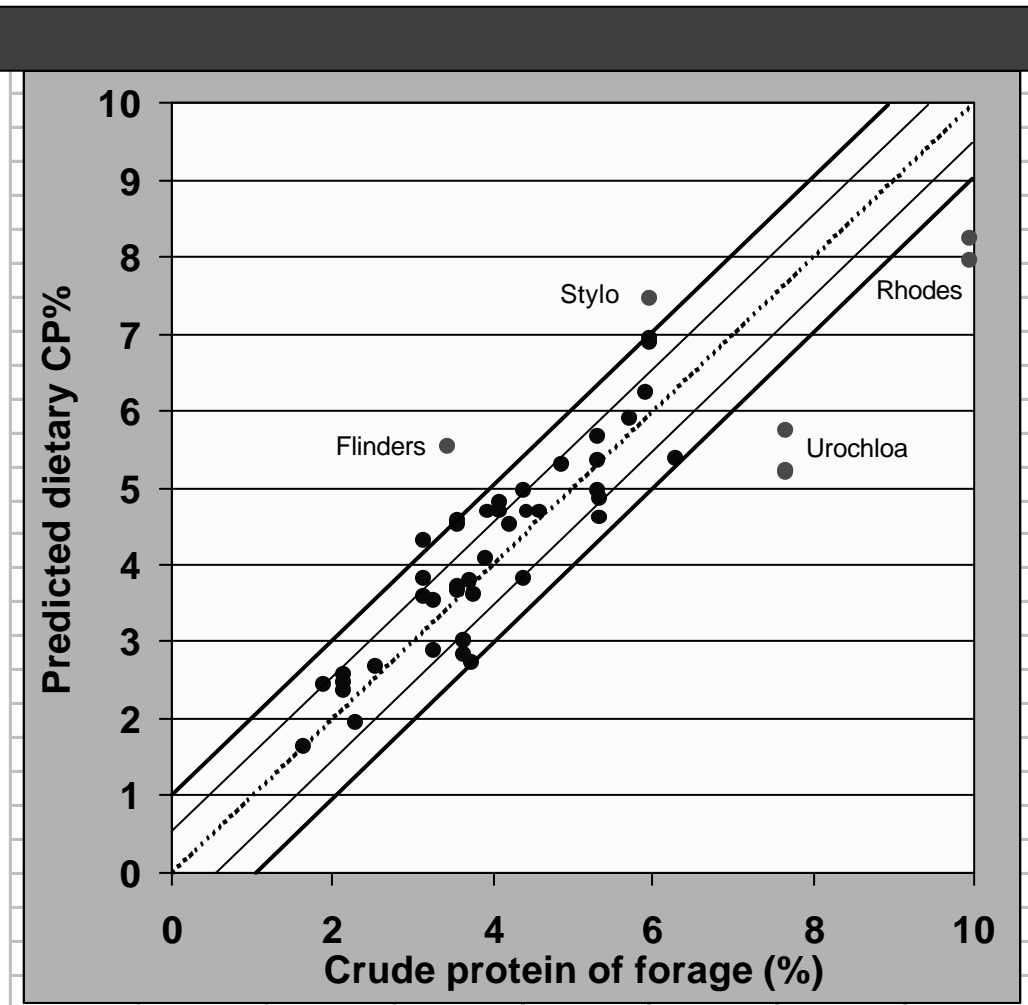
Faecal nitrogen

Dietary non-grass proportions

Growth rate

Dietary fibre fractions

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Relationship between predicted dietary CP and the protein content of forage offered for 50 different diets

PROBLEM AREAS

Mixtures of high quality and low quality forage types

Nitrogen fertilised grass

High browse diets

Status of current faecal NIRS equations

Dietary crude protein

Digestibility

Faecal nitrogen

Dietary non-grass proportions

Growth rate

Dietary fibre fractions

**WHAT IS BEING DONE TO
IMPROVE THE TECHNOLOGY**

MLA PROJECT

Improving the nutritional management of grazing cattle

Task Area 1 (Faecal NIRS)

Task Area 2 (supplements & nutritional relationships)

Task Area 3 (Technology transfer)

TASK AREA 1 (Faecal NIRS)

Feeding trials to improve diet quality predictions

Monitor herds to improve growth rate predictions

PhD student to investigate faecal NIRS and supplements

TASK AREA 2

**Supplement experiments to measure responses
relative to quality of the forage diet**

CONCLUSIONS ABOUT FAECAL NIRS

- An exciting technology with a lot of promise**
- Simple, practical, timely and inexpensive**
- Already being used quite extensively**
- Making good progress with further development**
- Continued and long term improvements expected**
- Will always have limitations and some goals may not be achieved in terms of meeting target levels of accuracy**
- Primarily a decision support tool to be used in conjunction with other technology and skills**

DIETARY PHOSPHORUS STATUS ASSESSMENT IN CATTLE

PRINCIPLES

- P requirement (intake relative to body weight) is not static
- P requirement varies with animal factors
- P requirement varies with productive potential of the diet as determined by protein and energy
- P concentration in pasture/diet varies enormously with ...
- Diagnosis of sub-clinical P deficiency is very difficult

P/N ratio for assessing dietary P status

(The ratio of faecal P concentration to dietary nitrogen (protein))

Faecal P is used as an index of dietary P concentration

Dietary N is used as an index of the protein and energy status (i.e. productive potential) of the diet

P/N ratio is therefore an index of the amount of dietary P available to the animal relative to requirements

Benefits of P/N ratio

Simple

Practical

Inexpensive

Based on the animal

Sampling time not critical

Can be used with cattle receiving P supplement

Indicative levels for P/N ratio

More than 0.21

adequate

0.16 – 0.20

marginal or suspect

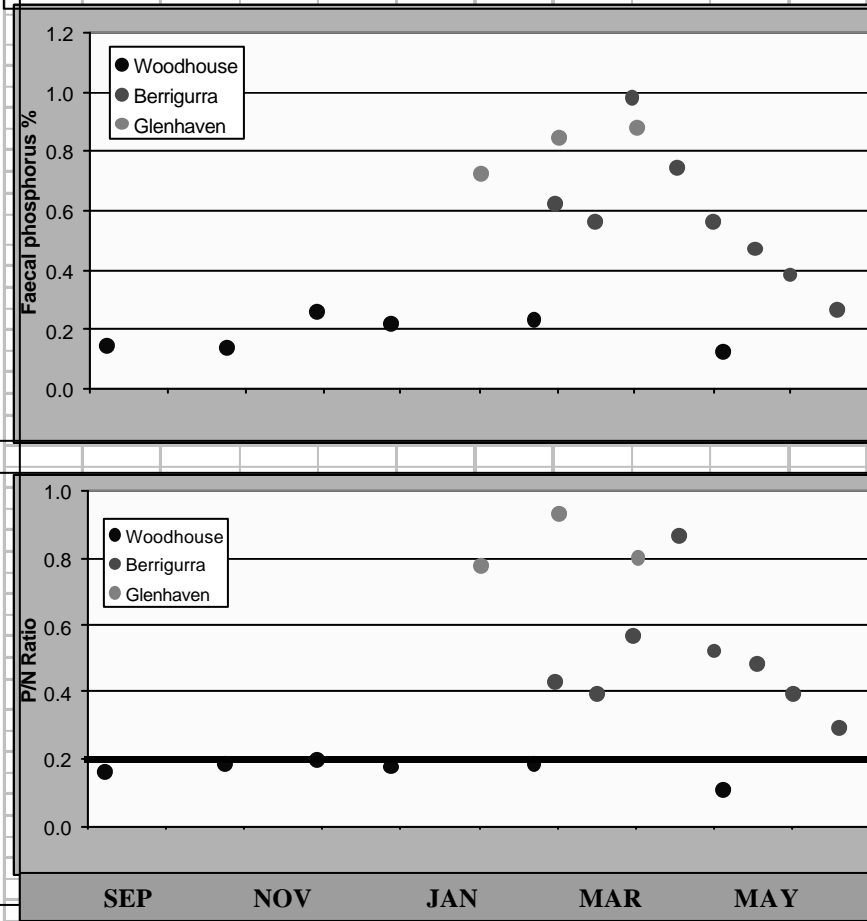
0.11 – 0.15

deficient

0.10 or less

severely deficient

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Faecal P concentrations and P/N ratios for Woodhouse (mean of 10 paddocks), Berrigurra and Glenhaven

Limitations of P/N ratio

Indicative levels need refining

Assumptions associated with use of faecal P and dietN

Indicative levels probably vary with pasture type

There may be breed differences in indicative levels

P/N CONCLUSIONS

Certainly not perfect

Need to know more about indicative levels

Simple, practical and inexpensive

Provides an assurance or a warning

Additional checks required where deficiency is indicated

Can be used to assess regional status