

Animal Nutrition and Productivity in Rotational Grazing Sheep



Kristen Ritson-Bennett BSc. Ag
Ruminant Nutritionist
Blue Rock Animal Nutrition Ltd.



BLUE ROCK ANIMAL NUTRITION

- Nutrition and Management Consulting
 - Nutrition practice is focused on science and evidence based management practices
- Custom Mineral Premix since 2012
- Cow-Calf, Feedlot, Bison, Small Ruminant
- Alberta, Sask, BC

Kristen Ritson-Bennett BSc. Ag

- University of Saskatchewan
- Small ruminant nutrition
- Grazing and Forage –CAFLA (GWFA), FFA, MARA, CARA, AFIN, West Central etc.

Overview:

- ❖ Nutrient requirements of sheep
- ❖ Sheep Management Systems
 - ❖ Sheep operations come in all different shapes and sizes
- ❖ How rotational grazing program complements the nutritional requirements of your flock to your
 - Session 1: Introduction to Rotational Grazing (February 11)
 - Session 2: Planning Your Rotational Grazing System (February 18)
 - Session 3: Forage Management and Soil Health (February 25)
- ❖ Discussion on how to leverage rotational grazing to meet the needs of your sheep
- ❖ Mineral supplementation
 - ❖ Use strategic supplementation - nutrition is both a science and an art
- ❖ Grazing and parasite control
- ❖ Key Performance Indicators for sheep operations in Canada



Successful Sheep Production

Grazing and Forage

Economics

Nutrition

Reproduction

Genetics

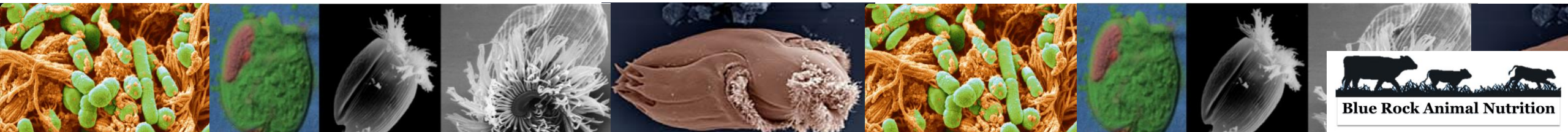
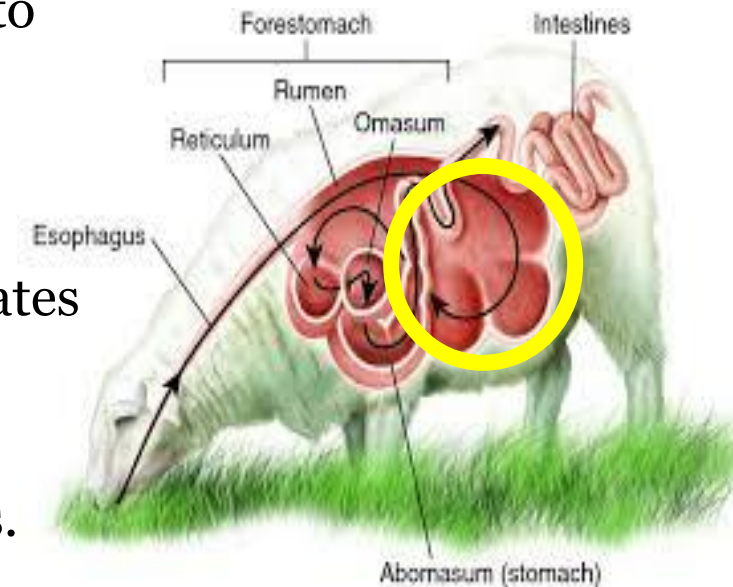


Herd Health

Ewe/Ram
Lamb
Development

Ruminant - what makes these animals unique?

- Ruminants have the ability to convert low quality, high fibre plants into high quality protein, milk and wool by way of fermentation
- 4 compartments
- Fermentation occurs in the rumen (breakdown of complex carbohydrates to VFA's) to provide energy to the animal
- Regurgitation is necessary for bicarbonate production (ph stability), providing liquid to the rumen and recirculating nitrogen and minerals.
- Health of the animal is directly correlated with the microbial population in the gut
- There are thousands of species of microbes in the rumen



What do the “Sheep Bugs” Need?

MACRO NUTRIENTS

Protein (Crude Protein)

Energy (TDN)

Fibre

Macro Minerals

WATER



MICRO NUTRIENTS

Trace Minerals

Vitamins



Blue Rock Animal Nutrition

- Requirement for Protein and Energy will vary depending on
 - Class
 - Sex - Male vs Female, maturity, goals (breeding or finishing)
 - Physiological stage
 - Stage of pregnancy, lactation, finishing, breeding ram, ewe being flushed
 - Breed
 - milking breeds vs meat breeds, # of expected lambs - twins or quint
 - Size
 - BCS
 - Environmental
 - Cold or heat stress, sheared vs not sheared

Nutrient Requirements for Ewes

Recommended Nutrient levels for Ewes
Adapted from NRC - Nutrient Requirements of Small Ruminants

Class	DMI % of BW	TDN%	CP%	Ca % (grams)	Phos % (grams)
Dry Open Ewes	2.3%	55-60% 1.2-1.9 lbs	10-11% 100-150 grams	0.4% 4.6-6.2 grams	0.24% 2.3-3.1 grams
Early- Mid Gestation (15 weeks)	2.5-3%	58-60% 1.47-2.1 lbs	11-12% 113-160 grams	0.6% 4.6-7 grams	0.3% 2.3-3.5 grams
Mid to Late Gestation (Last 6 weeks)	2.5-3%	62-67% 1.89-3.5 lbs	11-13% 177-300 grams	0.6% 5-10 grams	0.3% 2.3-3.5 grams
Lactation	3.0-4.5%	65-85% 2.8 - 5 lbs	14-16% 300-680 grams	0.7% 14-20 grams	0.35% 7-10 grams

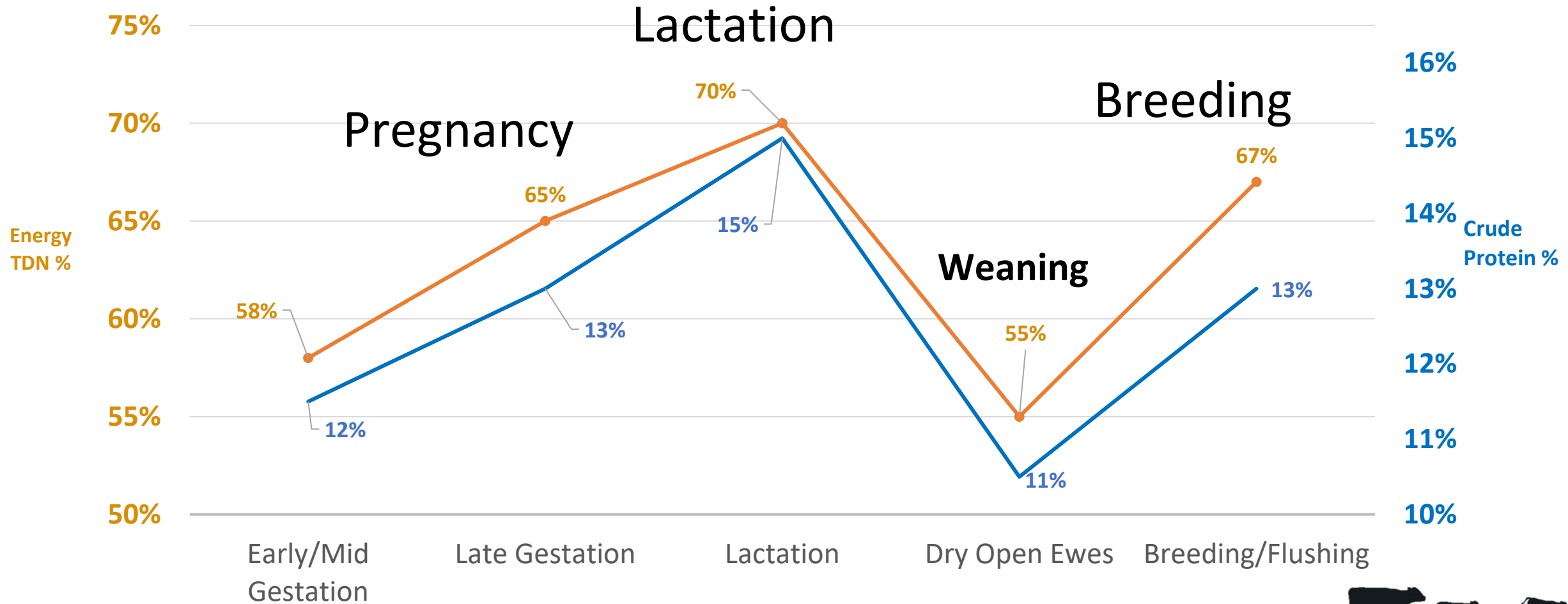
*In late pregnancy the NDF (Fiber) should be less than 40%

*Highly prolific ewes require the higher levels, 3 lamb crops every 2 years

****NOTE: Minimum of 2:1**

CAL:PHOS

PROTEIN AND ENERGY REQUIREMENTS OF EWES THROUGH THE PRODUCTION CYCLE



Nutrient Requirements for Feeder Lambs

Recommended Nutrient levels for growing and finishing sheep
Adapted from NRC - Nutrient Requirements of Small Ruminants

Class	DMI % of BW	TDN%	CP%	Ca %	Phos %
CREEP	-	70-80	20-22	0.9	0.45
22-50lbs	4.5-6.0%	76-78	18-20	0.6	0.3
50-70lbs	3.6-4.2%	74-76	16-18	0.6	0.3
70-120 lbs finish	3.0-3.6%	76-80	14-16	0.6	0.3

****NOTE: Minimum of 2:1 CAL:PHOS**

Macro Mineral	Function
Calcium	Bone and teeth formation, blood clotting, muscle contraction, milk production
Phosphorus	Bone and teeth formation, energy metabolism in almost every metabolic process
Sodium	Acid/Base balance, muscle contraction, nerve transmission, maintenance of blood ph
Magnesium	Enzyme Activator, skeletal tissue and bone
Potassium	Maintenance of electrolyte balance, enzyme activator, muscle and nerve function



Mineral

Trace Mineral Function

Trace Mineral Deficiency

Zinc

SKIN AND HOOV
ISSUES

- Protein synthesis
- on

- Abnormal skin and hooves
- Bone and joint problems

Manganese

Copper

REPRO
FADE
- Poor

Cobalt

Iron

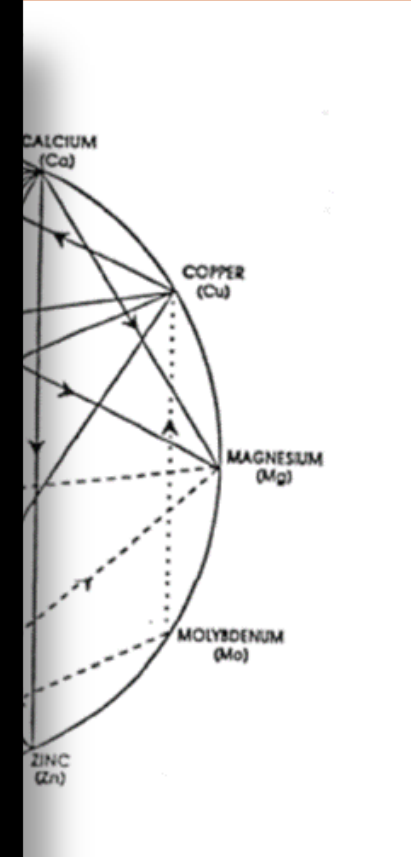
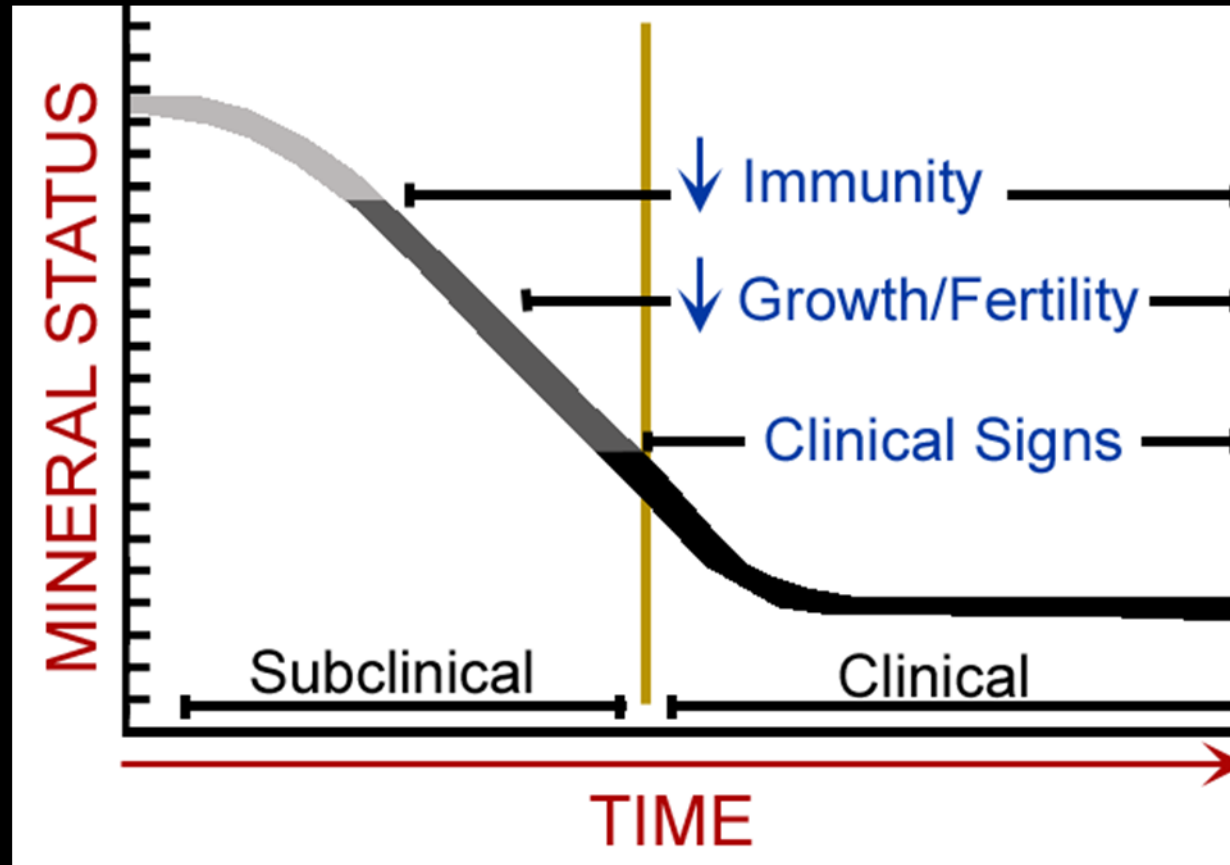
Selenium

WEA
NEO

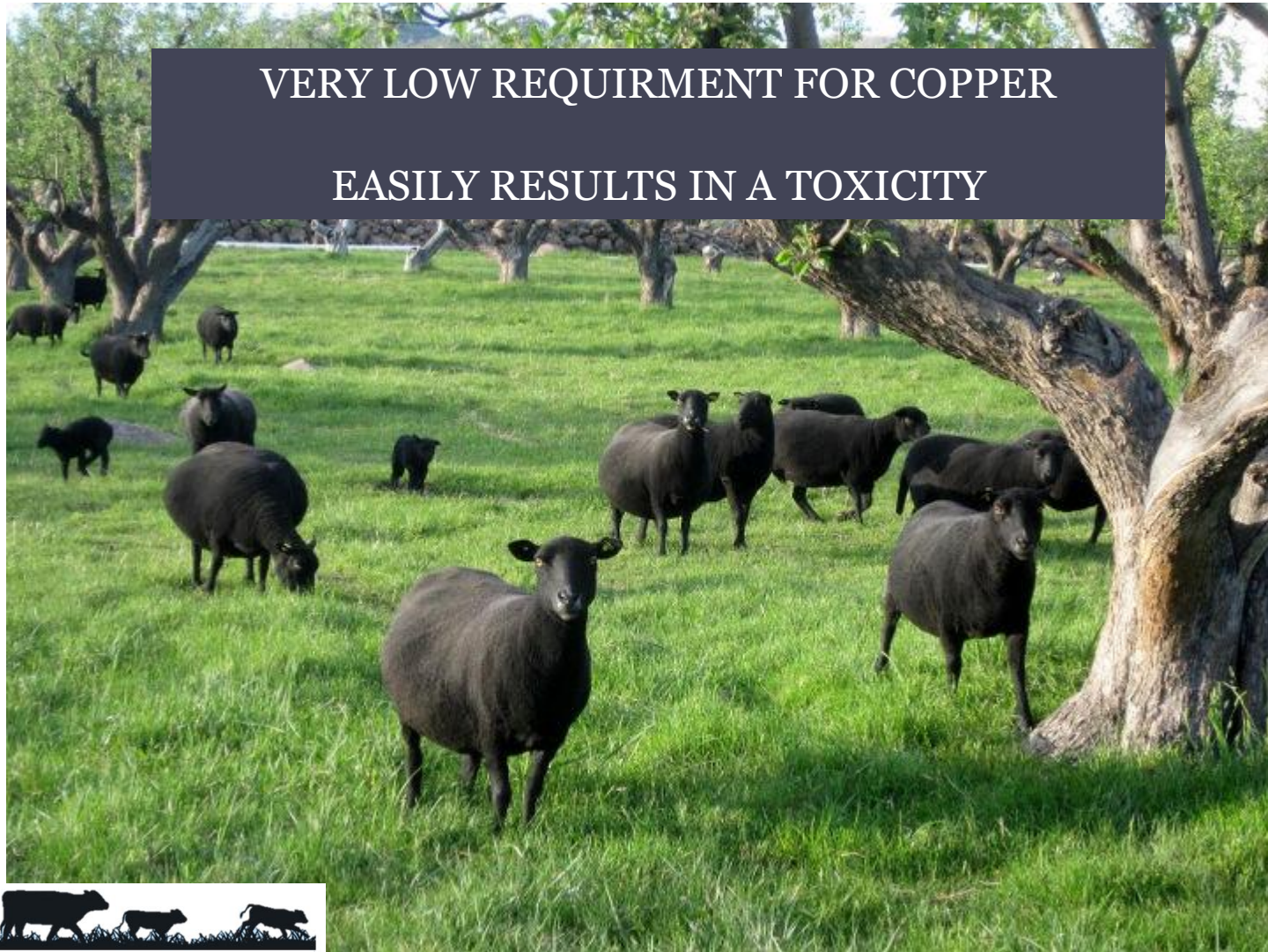
Iodine

- Thyroid hormone synthesis
- Thermoregulation
- Immune Function

- Enlarged thyroid gland; goiter
- Hair loss and dry scaly skin



Special Considerations for Sheep



- Sheep are very susceptible to copper toxicity
- When the liver becomes saturated with copper, tissue damage occurs in the liver and large amounts of copper are released into the bloodstream
- Copper is still a required nutrient – required for immune function, reproduction and wool quality

Supplementation of Vitamins

- Ruminants require fat soluble vitamins (A, D and E) in their diet.
 - Sheep also require B- vitamins, but these are synthesized in the rumen in adequate amounts and don't need supplementation
- Green growing grass – adequate levels of A/E,
- Mature and Preserved feeds– A/E not present in appreciable amounts
 - Levels drop significantly after blooming in alfalfa plants
 - Vitamin precursors oxidize in dried down feeds (pastures and hay) 80% drop
 - Plants at maturity drop levels by 50%
 - Ensiling process destroys vitamin precursors



Testing Your Feed

**YOU CAN'T MANAGE
WHAT YOU DON'T
MEASURE!!!**

- Talk to a nutritionist about your analysis if you don't understand
- Properly testing is critical to making informed decisions
- Learn how to read a feed test and compare to what you now know about requirements

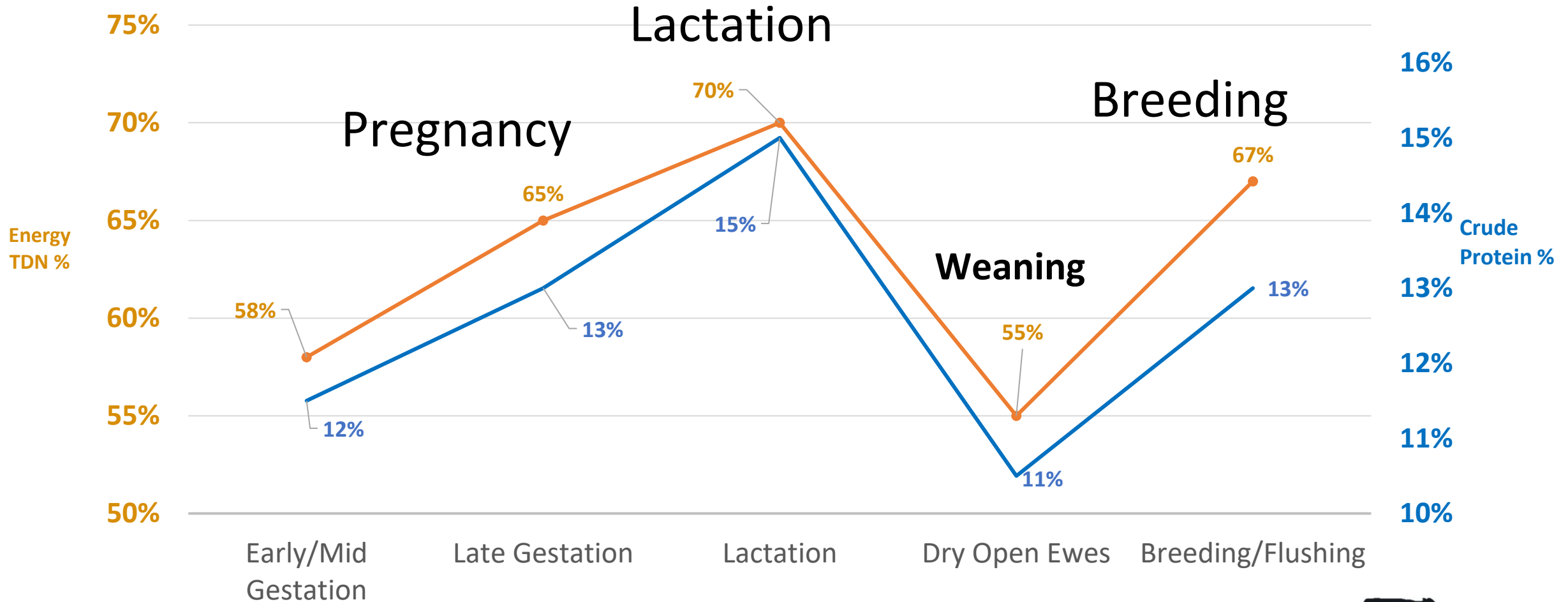


Management Systems

- What type of lambing system are you managing?
 - Early lambing (winter)
 - Late lambing (Spring)
 - Fall lambing (Sept-Nov)
 - Accelerated lambing (2 lamb crops per year)
 - 2 lamb crops per year, continuous, 3 lamb crop in 2 years (May mating/Oct lambing, Jan mating/June lambing, Sept mating/feb lambing.
- Matching grazing to nutritional needs



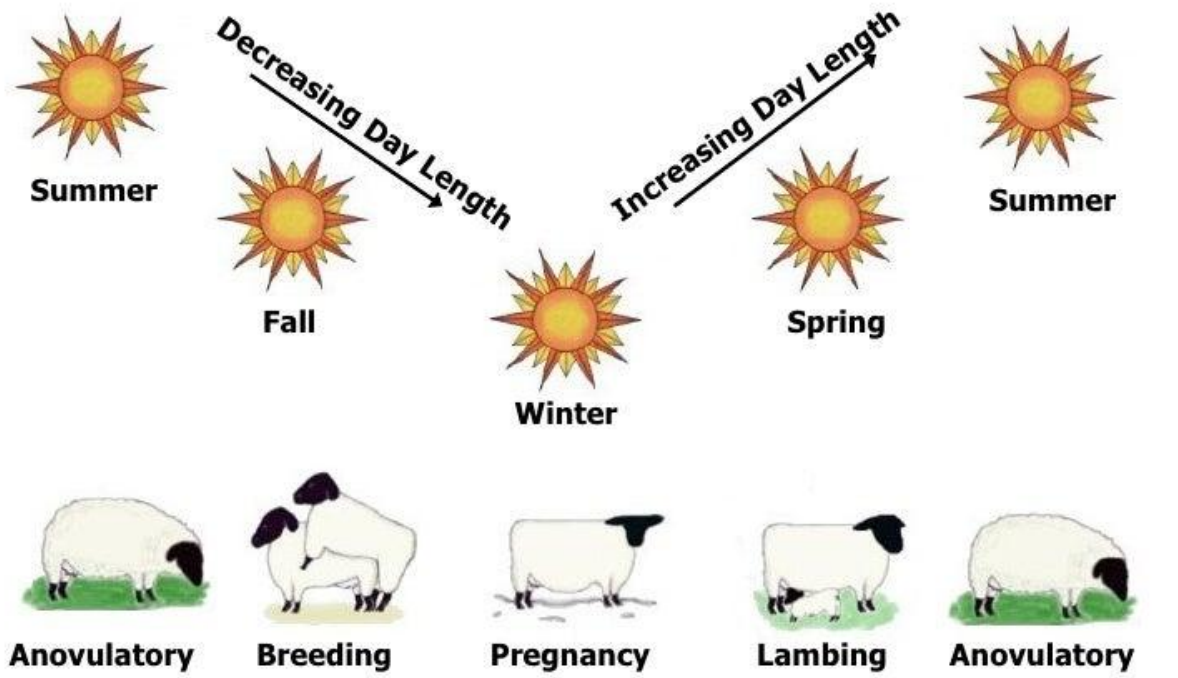
PROTEIN AND ENERGY REQUIREMENTS OF EWES THROUGH THE PRODUCTION CYCLE





Matching grazing system to nutritional requirements

Seasonal Breeding Cycle in Sheep



Geisert, 1999

Animal and Range Sciences

NDSU HETTINGER RESEARCH EXTENSION CENTER
NORTH DAKOTA STATE UNIVERSITY

NDSU Extension Service
North Dakota State University

SHORT DAY BREEDERS



Matching grazing system to nutritional requirements

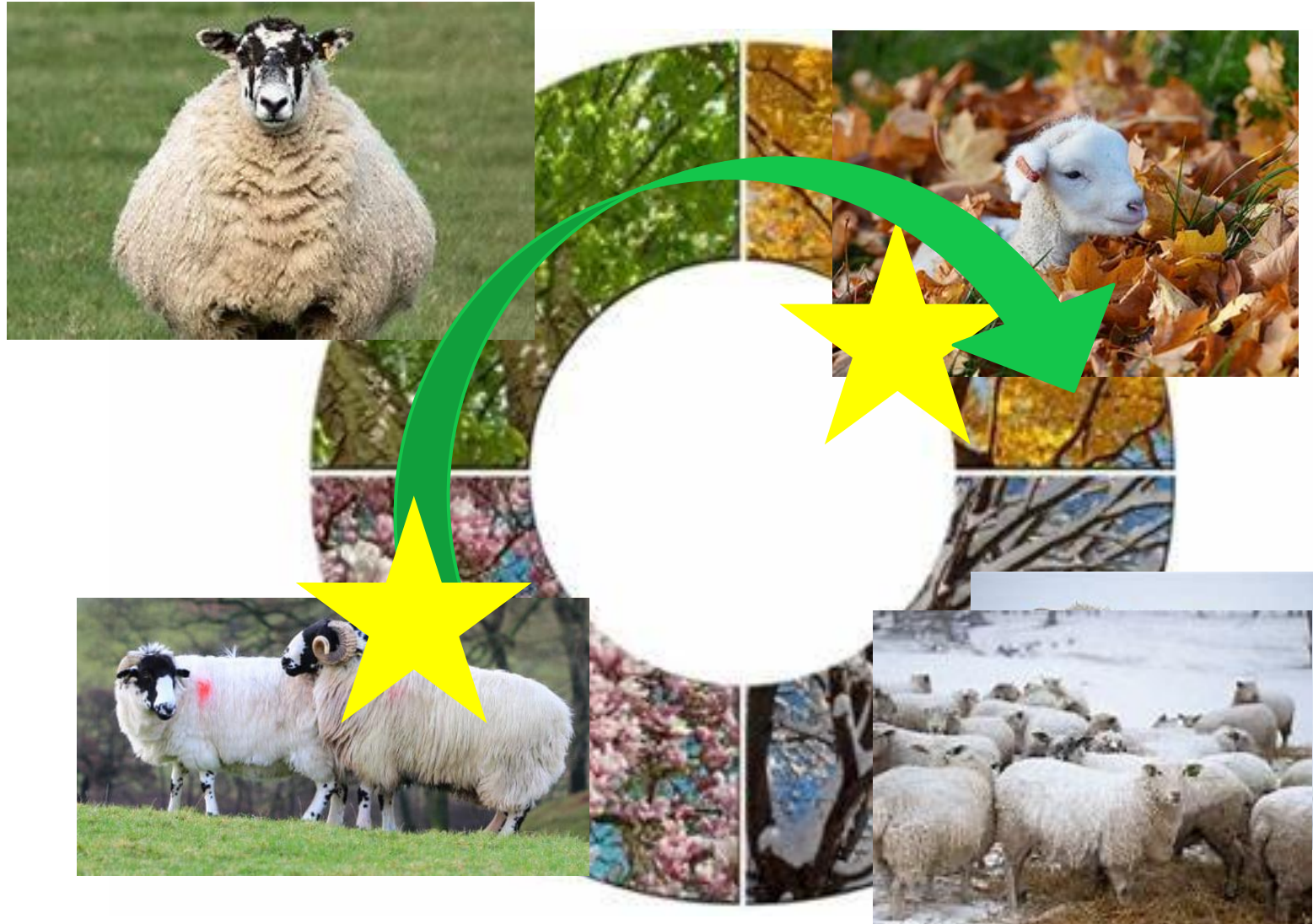
Fall Lambing

Advantages:

- Coincides with fall forage regrowth
- Weather ideal for pasture lambing
- Minimal parasites
- Marketing lambs when supply is low and demand is high
- Dry ewes being fed in winter (lowest reqt's)

Disadvantages

- Conception rates are lower
– 50-60%
- Often doing multiple lambing per year



Matching grazing system to nutritional requirements

Winter Lambing

Advantages:

- Winter labour availability?
- Lambs gone before summer
- Lamb price at marketing
- Carry more ewes on pasture compared to ewes with lambs at foot

Disadvantages

- Must have lambing facilities
- Overhead costs are very high
- High labour
- Higher incidence of mastitis, scours, pneumonia due to confinement
- High feed costs feeding high quality diet in winter months



What is the nutrition of our grass?

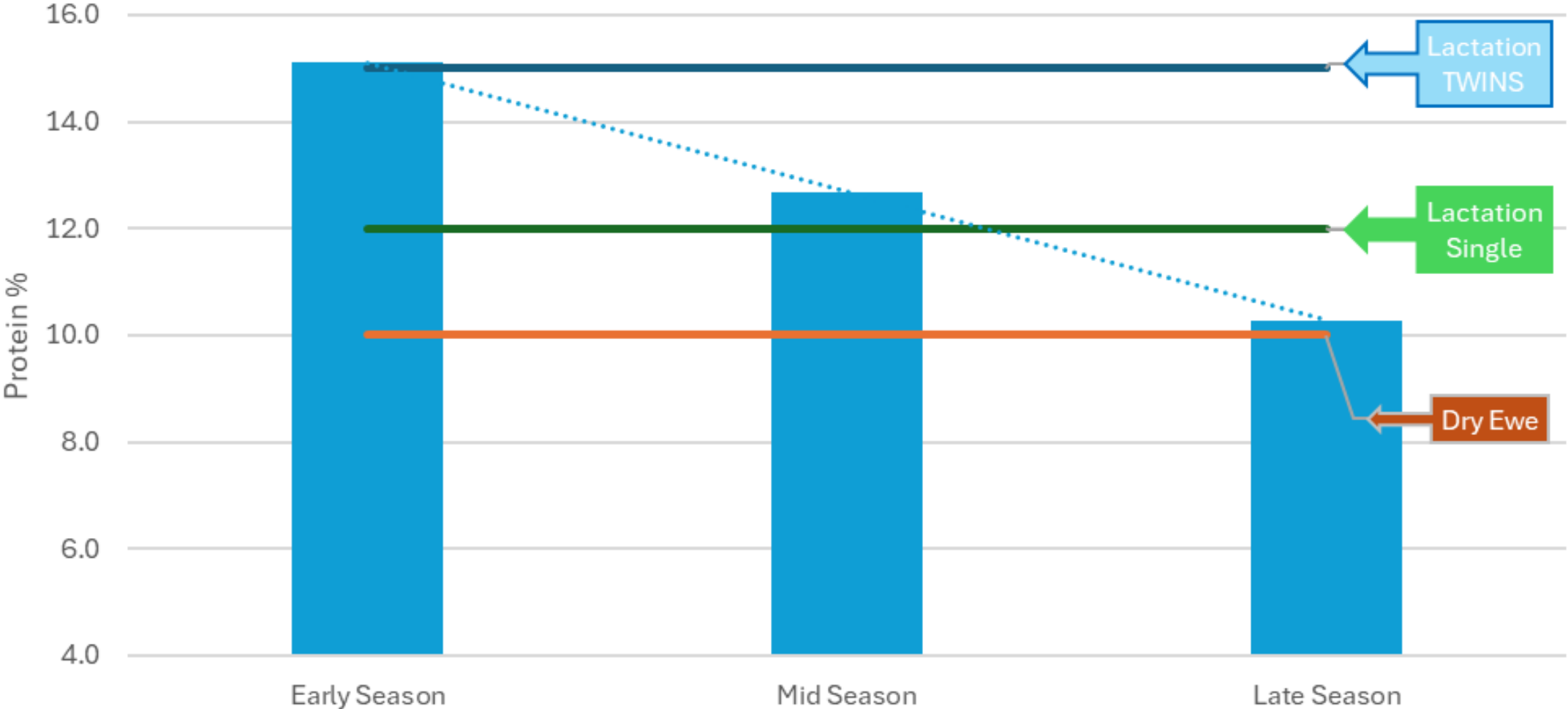
- Grass testing project – 2021, 2023, 2024
- 9 regions, 9 pastures within each region, samples are collected 3 times throughout the grazing season over 3 years
- Nearly 1000 samples taken and many km travelled
- Provides a huge dataset to provide us with more information on how nutrients change throughout the grazing season in each soil type – 3 years of drought.
- Overall – Protein and energy decrease as a plant moves from vegetative to dormancy
- Although this can differ plant to plant, mineral overall decrease with maturity.



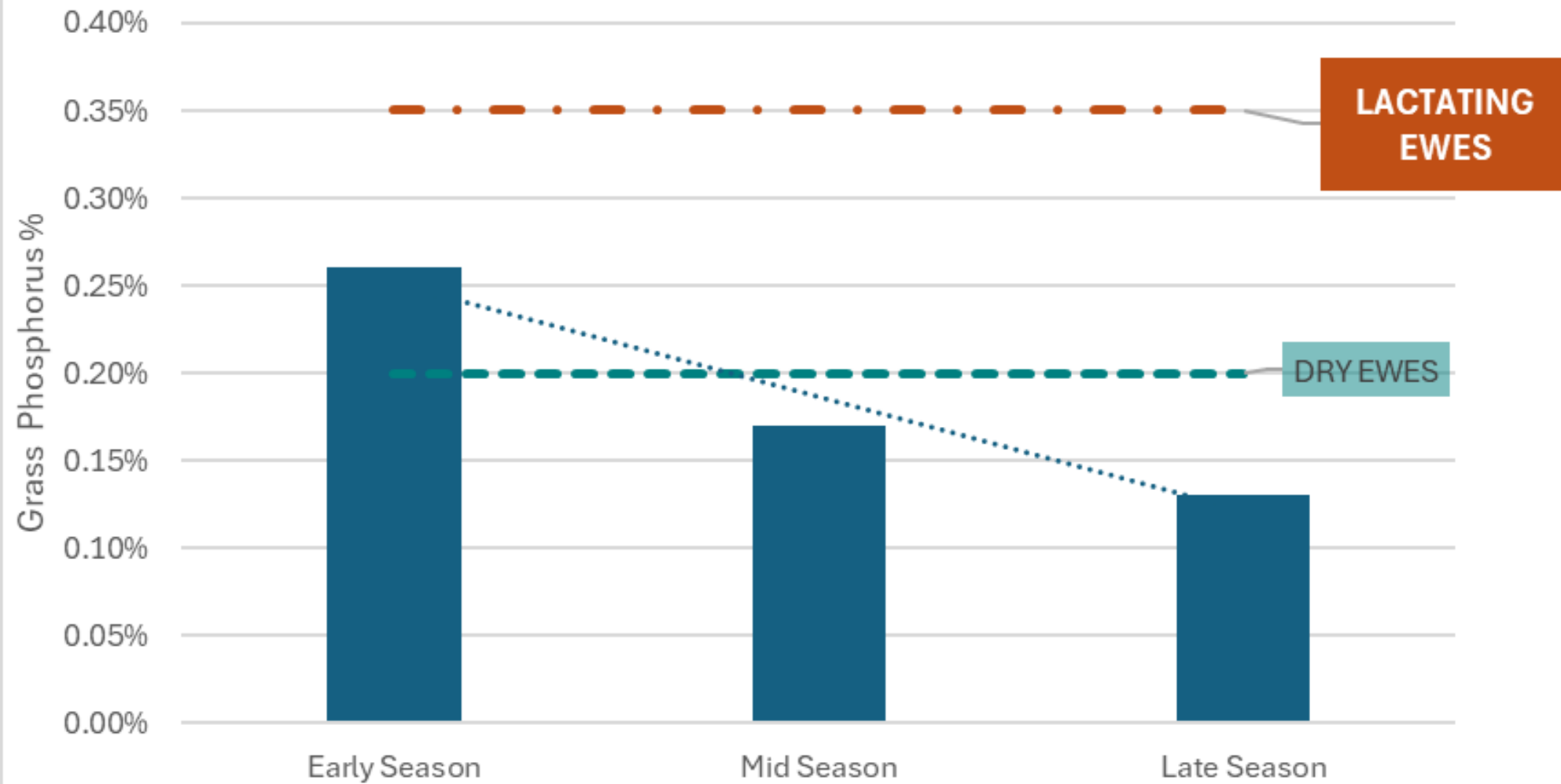
AFIN
ALBERTA FORAGE
INDUSTRY NETWORK



Provincial Average Protein %



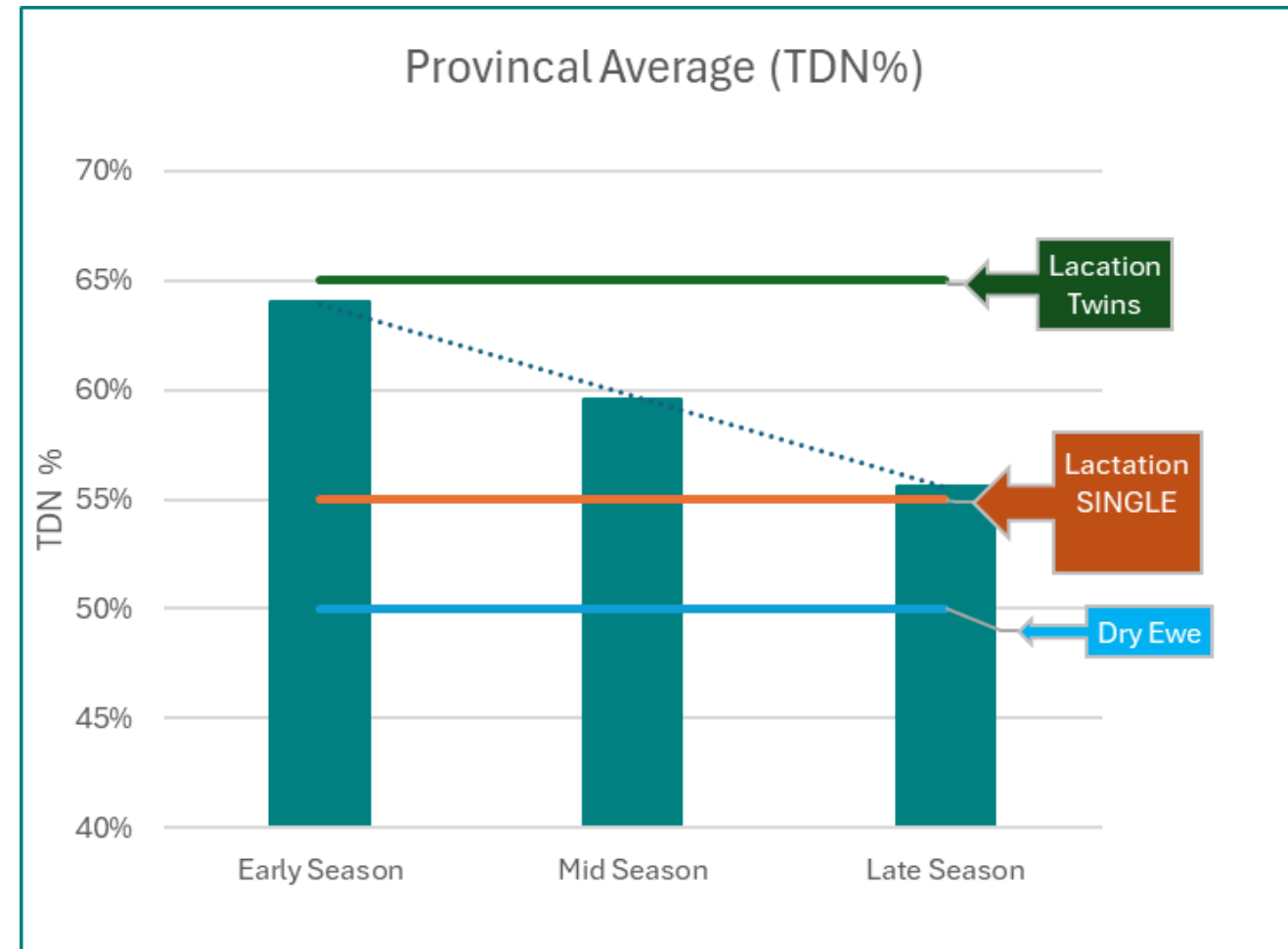
Provincial Average (Phosphorus %)



Take home message -

Energy and Protein

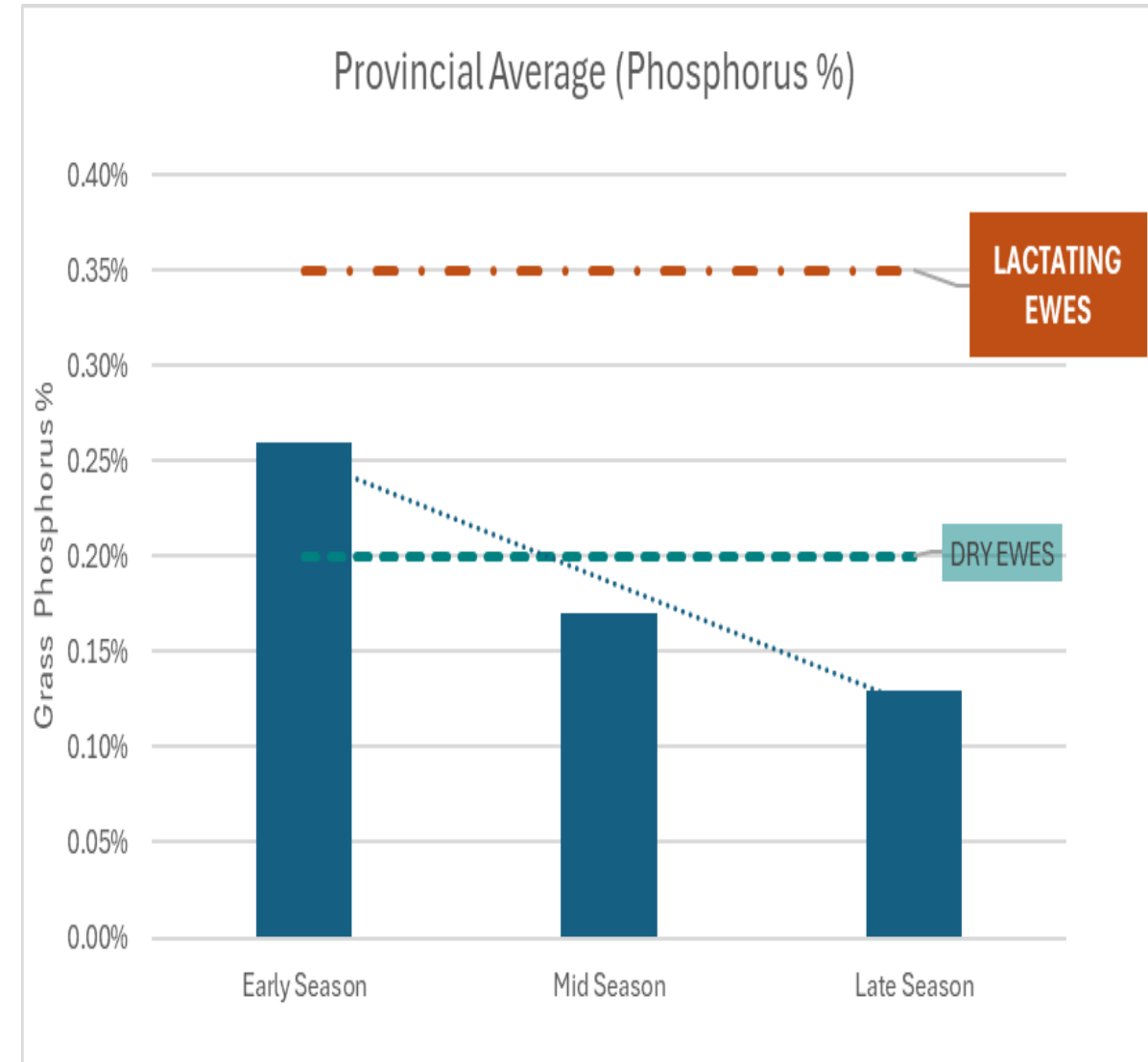
- If you can keep your grass vegetative (early season grass) you will be close to being able to maintain a lactating ewe with twins on pasture.
 - That will maximize the use of your grazing system
- Dry ewes have a relatively low requirement – still gaining on late season or mature grass.
- Maximize your grazing plan by keeping requirements in mind.



Take home message -

Mineral:

- To manage economics, need to know what we need and strategically supplement when needed to optimize production
 - Knowledge is power
- If ewes are lactating on grass (peak nutrient requirement)– they will need full mineral supplementation
- Dry ewes – need, at minimum, trace mineral supplementation.
- Once grass browns off time to look at supplementation of mineral within a few weeks.



Matching grazing to nutritional needs

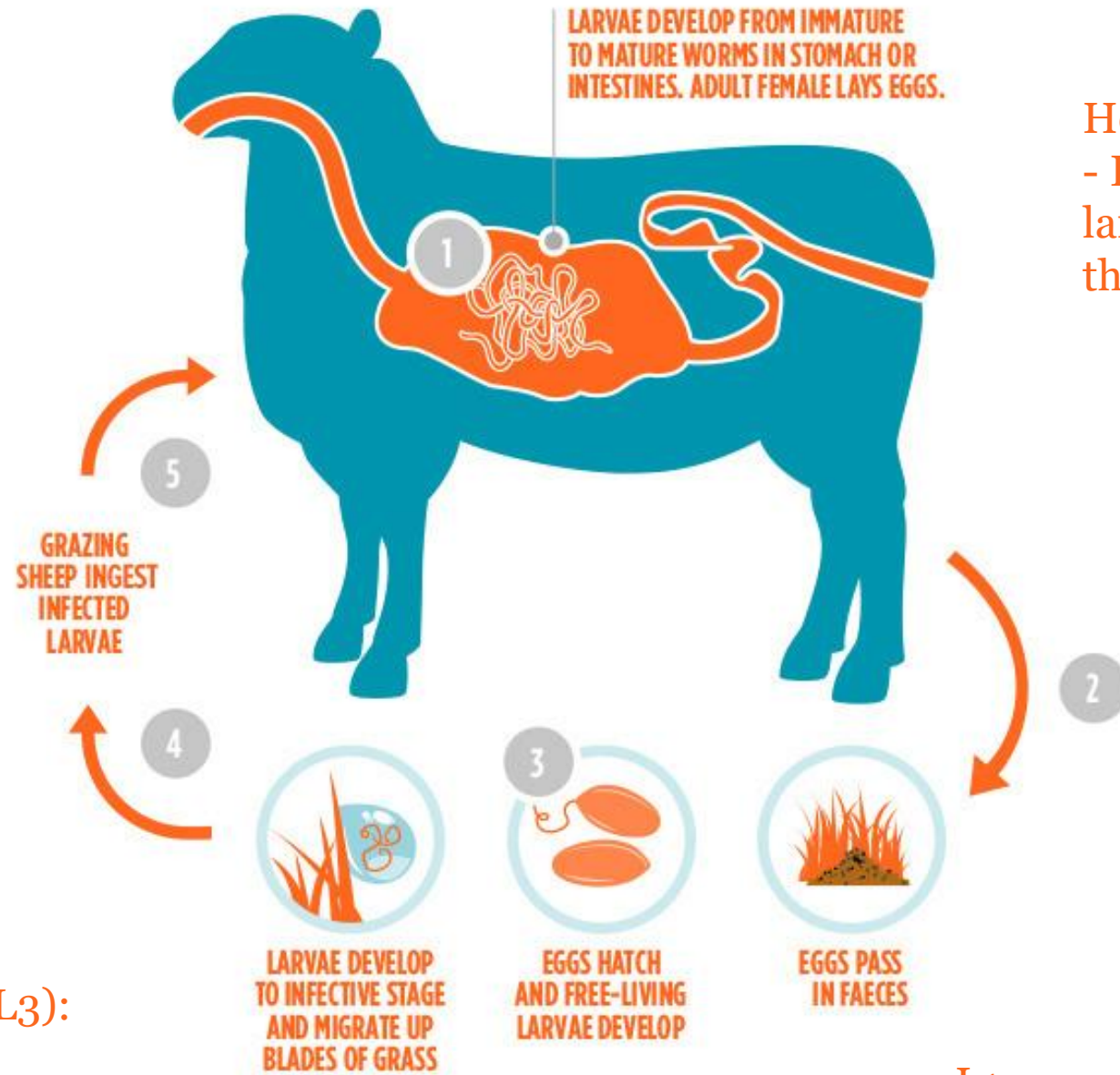
- Need to first identify what type of ewe (pregnant, lactating, dry, growing lambs) management system you are in and how it compliments with your grazing system
- Energy & protein levels drop as plants mature
- Minerals also drop as plants mature
- Fibre and non-digestible lignin increases with maturity
- What is the goal – fatten dry ewes? Support lactating ewes?
- Practice strategic supplementation throughout the grazing season
- Highly productive ewes are going to require more inputs

Parasites and Grazing - another tool in your toolbox

- Why are we concerned about parasites?
 - Parasites cause disease when they are present in large numbers or when the host animal is weakened by another disease or poor nutrition
- Pasture management is key to breaking the lifecycle of internal parasites
- The grazing habits of sheep and goats make them much more susceptible to parasites than other species.
 - Graze close to the ground
 - Little aversion to grazing where there is fecal contamination.



In the fall L3 stage may “arrest” in overwinter in sheep



Host Stage 16-21 days
- From immature larvae to adult female that sheds eggs

Egg to infective larvae (L3):
4-10 days

L1

Facts about parasites:

- We can employ tools to reduce parasite populations, but unrealistic to expect 100% eradication
- Want to leave a refugia population susceptible to anthelmintics
 - Talk to veterinarian for specific recommendations for deworming your flock. Every farm is unique
- Parasites are species-selective
 - sheep and goats share many of the same parasites, cattle, horses, chickens do not – complement each other well for multispecies grazing.
- Sheep pickup L3 larvae within a first few inches of the ground
 - Minimize overgrazing
- No parasite risk in a drylot or winter – cannot complete the cycle due to dry/cold conditions (can go into winter with a population)
- Goats are far more susceptible – very little to no natural resistance to parasites due to goats evolution of being a browsers – are not meant to graze close to the ground.



Grazing Strategies - Parasite Management



- Move sheep every 3-4 days – before the larvae become infective
 - When can you come back it?
- IT DEPENDS
- 40 days between rotation will break the cycle – moisture and temperature
- If you follow with cattle (or chickens!) then return with sheep the “bugs” are picked up by the alternate species and it doesn’t affect that host. Cleans the pasture.
- Don’t overgraze – pickup within the first few inches of the ground.
- Your grazing plan cannot 100% be built around parasite control. Put the grass first. This is just a tool. A few strategies to reduce the worm burden.

Key Indicators of Performance

- No 2 operations are the same – so context is important when comparing your operations to these key performance indicators (KPI)
- These are benchmarks for comparison purposes.
- Benchmarks are from Ontario Ministry of Agriculture – all charts adapted from their data.

Conception rates by age of ewe and month of breeding

Month of Breeding	% Conception 1 year old	% Conception 2 year old	% Conception 3 year old	ALL AGES
August	40.1%	83.6%	87.7%	70.5%
October	66.6%	93.1%	94.3%	84.7%
December	74.7%	95.3%	93.9%	88%
OVERALL	60.5%	90.7%	90.2%	N/A

Target Conception Rates

Season	Average Rate	Excellent Rate
IN SEASON	90%	96%+
OUT OF SEASON	50-60%	70%+

Non-Prolific vs Prolific Breed Benchmarks: Target Lambing, Weaning %

Trait	Non-Prolific Breeds	Prolific Breeds
Lambing %	165%	240%
Weaning %	150%	210%

Non-Prolific vs Prolific Breed Benchmarks: Lamb mortality

Prolificacy	Stillborn	Pre-weaning mortality	Post Weaning Mortality
Non-prolific	<2%	<8%	<2%
Prolific	<2%	<12%	<2%

Non-Prolific vs Prolific Breed Benchmarks: ADG, Adjusted Weights, Days to Market

Trait	STAGE	Non-Prolific Breeds	Prolific Breeds
Average daily gain	Pre-weaning 0-50 days	0.33 kg, 0.73 lbs	0.26 kg, 0.57 lbs
Average daily gain	Post weaning 50-100 days	0.33 kg, 0.73 lbs	0.3 kg, 0.66 lbs
Average daily gain	Total	0.33 kg, 0.73 lbs	0.28 kg, 0.62 lbs
Weight	Birth	5 kg , 11 lbs	3.5 kg, 8 lbs
Weight	50 days	21.5 kg, 47.5 lbs	16 kg, 35.5 lbs
Weight	100 days	38.5 kg, 85 lbs	31 kg, 68.5 lbs
Days to Market (110 lbs liveweight)	Target 110 lbs	136 days (4.5 months)	165 days (5.5 months)

Credit to Ontario
Ministry of Agriculture
– all charts adapted
from their data.

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Measuring sheep flock productivity

Learn how to calculate and the importance of some key production targets for the sheep. This technical information is for commercial sheep producers in Ontario.

ISSN 1198-712X, Published November 2022

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<https://www.ontario.ca/page/measuring-sheep-flock-productivity>

Final Thoughts:

- Get a basic understanding of nutrient requirements for sheep
 - Learn how to read a feed test and compare to the requirements you learned about today.
- There is not only one way to apply a grazing program to a sheep operation
 - Determine what your goals are
 - Maximize the use of labour and time
 - Leverage grass quality to your benefit
- Match your grazing plan to your nutritional needs
 - When are requirements highest? Increasing through gestation and peaking at lactation and breeding
 - You can take advantage of a planned grazing program by lining up production with vegetative grass
 - OR you can put weight on lambs or dry ewes – can be applied in many ways
- Mineral supplementation of lactating high producing ewes on grass is necessary. Use strategic supplementation – needs to make economic sense – nutrition is both a science and an art
- Use your grazing system as a tool to manage parasite on farm – build a relationship with your vet to build a parasite control program
- Look at Key Performance Indicators to see how your operation benchmarks against other operations
 - Keep in mind you must compare within a context, every operation is different. Good place to start



Questions?

Kristen Ritson-Bennett
Ruminant Nutritionist - Managing Partner
Blue Rock Animal Nutrition
Innisfail, AB

Office: 403-227-2742
e-mail: Bluerock.Kristen@gmail.com

