

# Implementing advanced nutritional management in the Welsh sheep industry



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# *Aim of the project*

- **Implementation** project
- **Smarter** nutritional planning
- Focus on **trace elements**
- But also considering:
  - Energy and protein
  - Concurrent disease e.g. Parasites etc.



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# Copper

- Helps absorb iron and used to make haemoglobin, useful in enzyme systems, needed for hair pigmentation
- Interactions with sulphur, molybdenum and iron
- **Deficiency** - swayback, reduced immunity to infection, anaemia, steely wool, scouring
- **Note: can be toxic, acute and accumulative!**



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# Cobalt



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- Required by microorganisms to make vitamin-B12.
  - **Deficiency** - Pine – **ill thrift**; decrease in appetite, weight loss, anaemia. Mild deficiencies hard to define clinically, general ‘poor doer’.
- Interaction with gastrointestinal nematodes
- Toxicity is **possible** but a wide safety margin therefore **unlikely**.
- Cobalt products can be **harmful to humans**, care when handling.



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# Selenium

- Present in glutathione peroxidase (enzyme) which helps remove hydrogen peroxide thereby protecting cell membranes.
  - Helps absorb and retain vitamin E
  - Both vitamin E and selenium help with immunity
  - Helps with production of thyroid hormones (alongside iodine)
- 
- **Deficiency:** ill-thrift
- 
- Can be toxic



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# Zinc

- Skin, hair, horn,
- Necessary for production of some hormones, production of antibodies, used in enzymes, used in cell replication
- **Deficiency** – growth and immunity effects
- Toxicity possible but wide safety margin



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# Manganese

- Activates enzymes, formation of bone
  - **Deficiency** – (rare) reduced growth, angular limb deformities
- Wide safety margin



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# *Iodine - unable to assess in this project*

- Production of thyroid hormones which are essential for many things e.g. immune function, development of foetus etc.
- **Deficiency** – reproductive abnormalities, weak lambs, reduced oestrus, reduced male fertility, goiter
- Can be toxic.



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# Investigation plan

- 12 farms in North Wales
- Background disease history – diagnoses, vaccines used etc.
- **Forage** samples – trace elements
  - what the potential supply could be
- **Blood** samples
  - Energy and protein
  - Trace elements
  - Concurrent disease
- **Faeces** samples
  - Parasites (fluke and worms)
- **Liver** tissue samples
  - Trace elements



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# Farm 4 - 2018

- Scanning percentage aim 180%
- Specific disease issues:
  - PGE (worms)
  - Fluke
  - Lameness



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# Farm 4 - 2018

- Pre-topping analysis

- Forage



- Magnesium ?
- **Copper**
  - Thiomolybdate issue in grass
- Low selenium

Mineral	Grass	Silage
Calcium	Ok	Ok
Phosphate	Ok	Ok
Magnesium	↑	↑
Potassium	↑	↑
Copper	Ok	Ok ↓
Iron	↑	↑
Molybdenum	↑	Ok ↑
Sulphur	↑	Ok
Selenium	↓	↓
Zinc	Ok	Ok
Manganese	↑	↑
Cobalt	Ok	↓



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# Farm 4 - 2018



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- Sheep investigations

- BCS 1.5/5 – reflective of poor growing conditions over the summer; no supplementary feed

- No fluke or worms identified

- Fluke treatments as planned



- Bloods

- Low E and P







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# Farm 4 – trace elements

- **Blood and liver biopsy**



- **Copper**                   some normal, some low and some very low.....
- **Selenium**               low
- **Cobalt**                   ok
- **Zinc**                     marginally low
- **Manganese**           some marginally low, others normal



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# Farm 4 - 2018

- Various issues identified
  - **Vitamin G!**
    - BCS BCS BCS BCS
  - **Copper**
    - Supplementation with drench as already started
  - **Selenium**
    - Supplementation with drench as already started
  - **Zinc?**
    - Likely to manage off the forage



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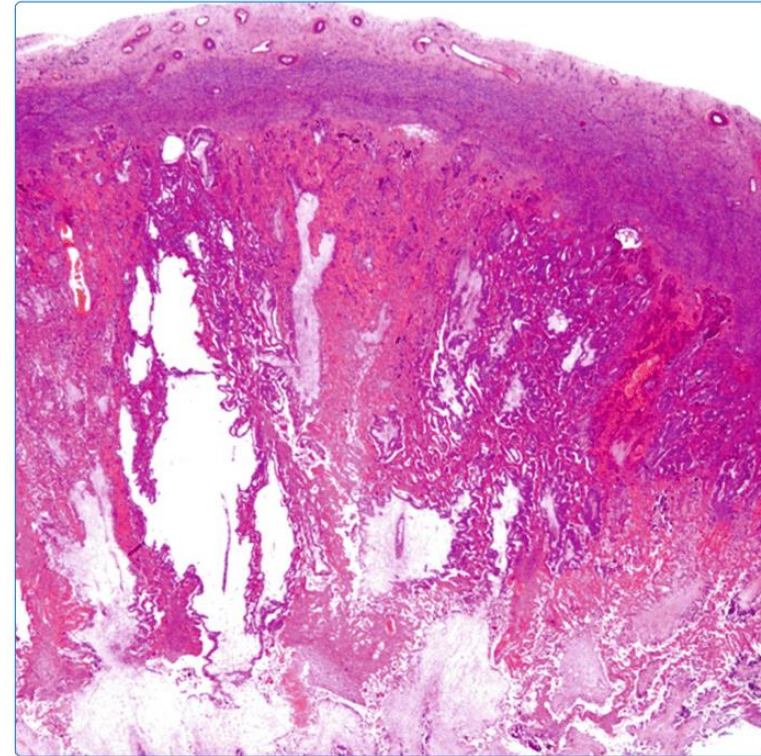


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# Farm 4

- At scanning (2018/2019):
- Extremely low scanning percentage (127%)
  - Low BCS
  - Toxoplasmosis identified on blood



Placental thrombosis in acute phase abortions during experimental *Toxoplasma gondii* infection in sheep

Castaño *et al.*



# Farm 4 - 2019



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- Monitoring bloods 3 weeks pre-lambing



- Metabolic profile

- Low E
- Low P
  - Feed adjustments

- Trace element monitoring

- |                 |                 |   |                          |
|-----------------|-----------------|---|--------------------------|
| • <b>Copper</b> | <b>very low</b> | → | <b>drench inadequate</b> |
| • Selenium      | marginally low  | → | drench adequate          |
| • Zinc          | marginally low  | → | forage adequate          |



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# Farm 4 - 2019

- Further liver samples from dead newborn lambs
  - 5/8 deficient
  - 3/8 marginally deficient
- Bolused ewes **CuSeCo** leaving the shed as heading to teart pasture and confirmed low



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# Farm 4 – 2019



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- Ewes
  - Further sampling in July/August
  - Revised plan:
    - **Closer monitoring of BCS**, feed if necessary
    - *Toxoplasma* vaccine
    - Monitor PGE, lameness and fluke
    - Pre-tupping bolus: **copper, selenium, zinc** if follow up sampling indicates is necessary
- Lambs (<35kg)
  - Selenium and cobalt bolus, possibly copper too



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# Farm 4 - 2019



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- Weaning/pre-tupping 2019
  - Average BCS 1.75-2.0/5 (06/08/2019)
  - Target BCS 3.5 by tupping
  - Likely gain 0.5-0.75 BCS units per month
  - Some sheep may struggle to reach this if grass not optimal +/- supplementary feed



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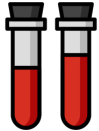
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- Adult fluke present! 
  - Overwintered metacercariae (mild winter)
  - Treatment albendazole
  - Further treatment in autumn with triclabendazole due to moderate risk forecasted
  
- Bloods 
  - Slightly Low E and P
  - Just been weaned? Also fluke



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# Farm 4 – trace elements (2019)

- **Blood and liver biopsy**



- **Copper**                      one low, half normal, three above normal
- **Selenium**                      low
- **Cobalt**                      ok
- **Zinc**                      normal
- **Manganese**                      some marginally low, others normal



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# Farm 4 – trace elements

- Overall improvement, however **improved timing of bolus**, move from spring to pre-tupping.
- In the meantime:
  - **Selenium** supplementation pre-tupping.
  - **Copper** and **selenium** drench around scanning.



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# Summary

- Trace elements are not everything
- Grass is more important
- BCS BCS BCS
- Optimise parasite control
- Consider other infectious diseases



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# Thanks for listening



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