



Metabolic Diseases | Introduction الأمراض الأيضية | المقدمة

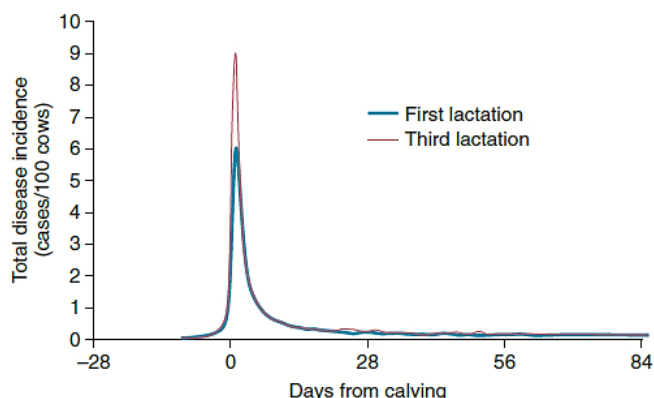
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Summary:

- **Metabolic Diseases** are conditions that arise from imbalances in nutrient metabolism, usually due to the rapid change in production levels or energy demands.
 - Sometimes metabolic diseases are known as Production Diseases.
 - These conditions usually occur when the rate of the **output of production** is greater than the **input of dietary nutrients**. For example, a ration may contain sufficient protein for milk production but contains insufficient precursors of glucose to replace the energy excreted in the milk.
- Metabolic diseases are very important in dairy cows and pregnant ewes.

Transition Period in Dairy Cows

- It is the period around calving (periparturient period) when the cows are transiting from being dry (not lactating) to lactating.
- In this period, there is a rapid rate of exchanging water and nutrients:
 - sudden variation in the excretion or secretion in milk or by other routes.
 - sudden variation in the intake due to changes in ingestion, digestion, or absorption.
- All these conditions can damage or change the internal environment of the animal.
- Nutritional or management limitations during this time may disturb the ability of the cow to reach maximal milk production.
- A substantial decrease in dry matter intake is initiated in late pregnancy and continues into early lactation, with the lowest intake occurring on the day of calving.
- Cows during the transition period also undergo a period of reduced immunologic capacity.
- The total disease incidence rapidly increases in the very late periparturient period, peaks on the day of parturition, and then rapidly declines until day 7 of lactation.





Metabolic Profile Testing

- It is a method used to monitor the nutritional and metabolic status of dairy herds.
- It is useful to predict whether an individual cow is metabolically prepared to undergo a stressful lactation.
- There are five main areas of interest for metabolic profile testing:

1. Energy balance: measuring:

- Nonesterified Fatty Acids (NEFA), β -Hydroxybutyrate (BHB), and blood glucose concentration.

2. Protein evaluation

- Urea nitrogen, creatinine, albumin, and total protein concentrations.

3. Liver function

- Aspartate amino-transferase (AST), sorbitol dehydrogenase (SDH), alkaline phosphatase, and gamma-glutamyl-transferase (GGT) activities.

4. Macromineral evaluation

- Abnormalities of the blood levels of calcium, phosphorus, magnesium, and potassium in the cow during the transition period are involved in subclinical hypocalcemia, clinical milk fever, hypomagnesemia, and acute hypokalemia.

5. Urine evaluation

- Urine is the optimal fluid to monitor acid–base and calcium status in dairy cattle.
- Urine samples are easier to obtain than blood samples.
- pH papers provide an inexpensive and clinically useful insight into acid–base homeostasis.

- The traditional approach to herd-based assessment of metabolic status is called the **Compton metabolic profile test**.

- The test measures certain components of plasma or serum of 7 to 10 cows per subgroup to reflect the nutritional status of the subgroup, with or without the presence of clinical abnormalities.
- The proper use of metabolic profiles depends on the timing of blood tests, the selection of cows to be included, and the background information about the farm, feeding and feeding system, and physical state and performance of the cows.

Metabolic Profile Parameters in Cattle – Optimum values	
Parameter	SI units
BHB	
Milkers	Below 1.0 mmol/L
Dry cows	Below 0.6 mmol/L
Plasma glucose	Over 3.0 mmol/L
NEFA	
Milkers	Below 0.7 mmol/L
Dry cows	Below 0.4 mmol/L
Urea nitrogen	1.7–5.0 mmol/L
Albumin	Over 30 g/L
Globulin	Under 50 g/L
Magnesium	0.8–1.3 mmol/L
Phosphate (inorganic)	1.4–2.5 mmol/L
Copper	9.4–19.0 μ mol/L
Thyroxine T4 (iodine)	Over 20 nmol/L
GSHPx (selenium)	Over 50 units/g Hb

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References:

Constable PD, Hinchcliff KW, Done SH, et al. (2017). Veterinary Medicine: A Textbook of the Diseases of Cattle, Horses, Sheep, Pigs, and Goats. 11th ed. Elsevier, St. Louis, Missouri, USA.