



## Overview on Chemical and Physical Parameters in Animal Metabolism

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### Description

The combination of chemical reactions and physical processes collectively form the metabolism. Understanding the chemical and physical parameters of animal metabolism is essential not only for unraveling the mysteries of life's sustenance but also for advancing veterinary medicine, improving livestock production, and gaining insights into human health. The heart of animal metabolism lies the breakdown of nutrients like carbohydrates, proteins, and fats. Enzymes, the biochemical catalysts, play a pivotal role in these processes. Carbohydrates are enzymatically converted into glucose, proteins into amino acids, and fats into fatty acids and glycerol, providing the building blocks for cellular function and energy production. Cellular respiration is the essential process where chemical energy stored in nutrient molecules is converted into Adenosine Triphosphate (ATP), the cellular currency of energy. Glycolysis, the Krebs cycle, and the electron transport chain are key stages in this intricate dance, occurring within the cellular powerhouse, the mitochondria. Oxygen plays a critical role in the final electron transport, facilitating the efficient extraction of energy.

Animal metabolism is a network of interconnected pathways. The citric acid cycle, gluconeogenesis, and lipid metabolism are but a few of the intricate biochemical processes that govern the fate of nutrients within the organism. The regulation of these pathways is finely tuned,

responding to the immediate energy needs and the availability of nutrients. Chemical messengers, or hormones, play a central role in regulating metabolic processes. Insulin and glucagon, for example, orchestrate glucose homeostasis. Thyroid hormones govern overall metabolic rate, while cortisol responds to stress by mobilizing energy reserves. The endocrine system acts as a conductor, coordinating the chemical symphony of metabolic activities.

Physical parameters such as body temperature profoundly influence metabolic processes. Animals employ various mechanisms, from shivering to panting, to regulate body temperature within a narrow range conducive to optimal enzyme function. The metabolic rate is intricately linked to thermal equilibrium, emphasizing the physiological importance of temperature control. Animal metabolism is profoundly influenced by physical activity. Whether it's a predator chasing its prey, a bird in flight, or a mammal engaged in foraging, the energy demands of physical activity are met by the metabolic machinery. Muscular activity, in particular, contributes to the dynamic interplay between energy expenditure and replenishment. The metabolic rate quantifies the rate at which an organism expends energy. Basal Metabolic Rate (BMR) reflects the energy required for basic physiological functions at rest, while total metabolic rate encompasses all energy expenditures, including those associated with physical activity and thermoregulation. The metabolic rate is a key parameter in understanding an animal's energy needs and adaptations. The physical parameter of body composition, including the distribution of fat and lean mass, reflects the balance between energy intake and expenditure. Animals store excess energy as fat, serving as a reservoir for times of scarcity. The regulation of body composition is a dynamic process influenced by genetic factors, diet, and metabolic rate.

The interplay between chemical and physical parameters in animal metabolism is governed by the principle of homeostasis. Animals strive to maintain a dynamic equilibrium in nutrient levels, body temperature, and energy balance. Regulatory mechanisms ensure that deviations from optimal conditions trigger compensatory responses to restore balance. Animals exhibit remarkable metabolic flexibility, adapting to diverse environmental challenges. Hibernation, migration, and torpor are examples of adaptive responses that allow animals to modulate their metabolic processes in response to seasonal changes, food availability, or environmental stressors.

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