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Ingestive behaviors in livestock: A review

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Abstract

Ingestive behavior in livestock is the process of food and water consumption, encompassing all actions from seeking out food and drink to the actual intake and digestion. This includes grazing, eating hay or grain, and drinking, and is a complex process regulated by psychological, metabolic, and physiological factors. It is a critical behavior for ensuring an animal gets the necessary nutrients for its performance, health, and welfare. The aim of this review paper is to systematically analyze the ingestive behavior of domestic animals. It concentrates mainly on description and synthesis of behavioral traits that guide ingestion, considering these behaviors as an essential indicator of natural behavioral expression and welfare status, generally contributing to my interest in animal ethology as a graduate student.

To conduct this review, we employed a systematic approach where synthesis of literature that was primarily sourced from academic databases including Animal Bioscience and Wiley, using key behavioral terms combined with species specific search. The review focused on peer reviewed studies from the year 2010, ensuring currency while including past literature on ancestral behaviors and ecology to document the baseline. The findings were organized according to themes and species to compare different behavioral types for example rumination in ruminants and foraging and meal patterns in non-ruminants. This synthesis highlighted the causes of these behaviors: internal motivation cues like satiety and thirst and external environmental motivators like social hierarchy and feeder design. Understanding and supporting of the behaviors that the animals portray is important for developing management systems that support animal production and promote animal welfare.

Keywords: Ingestive behavior, foraging, rumination, ethology, animal welfare

1. Introduction

Kenya's livestock sector supports a large and diverse population, including cattle, goats, sheep, camels, pigs, donkeys, and poultry. The country has approximately 22.9 million heads of cattle, including both beef and dairy breeds, Around 32.6 million of goats, reflecting an upward trend in semi-arid and arid regions, approximately 24.8 million of sheep, largely concentrated in arid and semi-arid rangelands, about 4.4 million camels, primarily in northern Kenya, roughly 59 million chicken, including indigenous, broilers, and layers, around 1.4 million Donkeys, mainly in pastoralist areas and about 0.7 million pigs, concentrated in smallholder systems. (Kenya Land Commission, 2023; Kenya National Bureau of Statistics, 2024; National Environment Management Authority, 2021) ^[37, 44]

Understanding the ingestion behaviour of livestock is crucial for optimizing production efficiency, managing animal health and welfare, tailoring management strategies to individual needs, and ensuring environmental sustainability. It increases livestock production and efficiency by; Optimizing Nutrient Intake- Different species and individuals have varied feeding patterns (e.g., meal frequency, bite size, feeding rate). Understanding these allows for the formulation of balanced rations and the design of feeding systems that ensure all animals receive adequate nutrients, maximizing growth rates, milk yield, and reproductive performance; Improving Feed Efficiency; Knowledge of invective behavior helps farmers manage feed presentation and accessibility, which can improve feed conversion efficiency. This means producing more with less feed, leading to higher profitability and less waste and Effective Grazing Management; For grazing animals, understanding behaviors like bite mass, bite rate, and diet selection helps managers optimize the use of pastures and rangelands,

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Ensuring efficient forage utilization and preventing overgrazing. In Kenya, livestock ingestion behaviour is primarily characterized by foraging on natural pastures, supplemented by cultivated fodders and crop residues (Munyua *et al.*, 2020; Kahi *et al.*, 2021) ^[36], which is heavily influenced by seasonal feed availability, farming systems (zero-grazing vs. semi-intensive/pastoral), and feed quality. A major challenge in Kenya is the significant seasonal fluctuation in feed availability due to variable rainfall patterns. During the dry seasons, natural pastures decline in quality and quantity, leading to severe feed shortages, particularly in semi-arid regions (Ng'eno *et al.*, 2022) ^[45]. Common feeds include Napier grass, Boma Rhodes grass, maize stover (crop residue), lucerne, and other fodder shrubs. The quality varies widely, with crop residues and dry season grass often being low in protein and high in fibre, which impacts intake and performance. To bridge nutritional gaps, particularly during dry seasons or for high-producing dairy cows, farmers provide supplements such as commercial dairy meal, milling by-products (bran, pollard), and protein-rich legumes. Feeding frequency, feed presentation and storage methods for conserved feeds like hay and silage all affect ingestion and utilization efficiency. High environmental temperatures can alter feeding patterns, leading animals to eat more during cooler hours. In East Africa, the ingestion behaviour of livestock is primarily determined by their species-specific foraging preferences and the significant influence of seasonal forage availability especially between wet and dry seasons (Muriuki *et al.*, 2020; Mwang'ombe *et al.*, 2021) ^[42]. Livestock production in the region is predominantly an extensive system relying on natural pastures and crop residues, which are often low in quality (Oba *et al.*, 2022) ^[46]. In Kenya, livestock ingestion behavior is primarily dictated by the production system e.g. grazing vs. zero-grazing and the specific feeding preferences of the animal species e.g. grazers vs. browsers (Munyua *et al.*, 2020; Makokha *et al.*, 2021).

Ingestive Behavior in Cattle

Ingestive behavior in cattle includes various activities related to feeding, drinking, chewing, and ruminating, all of which are crucial for their health, productivity, and welfare. According to Ronald Kilgour and Clive Dalton's livestock behaviour, a practical guide, a cow's day is divided into clearly defined periods of grazing, rumination (chewing the cud), idling and resting. Dairy cows may require increased feeding time extending into the night by 1-4 hours to compensate for decreased day time feeding and nutrient loss through lactation. A study done to investigate feed preference by cattle showed the ability of cows to learn to operate mechanical devices which encourage them to work for their feed. After eating the animals retire to safety to ruminate. Boluses of partly digested material are regurgitated, chewed to finer particles and then re-swallowed. Studies have shown that 65-80% of rumination occurs while the animal is lying down, although in wet weather the animals ruminate while standing. Up to 1 minute is spent chewing one bolus, there are 15-20 rumination periods in a day for adult animals. Feeding concentrates to cattle generally reduces the time spent ruminating in comparison to fibrous feeds. The study of these behaviors provides key insights into optimizing feeding strategies, animal welfare, and farm profitability. These behaviors are influenced by forage structure, quality, and environmental conditions. For example, research demonstrates that sward height and herbage mass

significantly affect bite size and grazing time, impacting intake rates during pasture-based feeding (Giovani *et al.*, 2022). According to L. Hautshani *et al.* 2013, and T. Devries *et al.* 2009, cattle exhibit faster feeding bouts when transitioned to high-concentrate diets compared to high-forage ones in feedlots, but such dietary transitions may reduce overall rumination time and increase risks of metabolic disorders. Cattle also exhibit rumination which is vital for breaking down fibrous material and extracting nutrients efficiently. It involves regurgitating, rechewing, and re-swallowing feed. The duration and quality of rumination vary with diet type, feed composition, and environmental factors. For example, cows on fiber-rich diets exhibit longer rumination periods compared to those on more digestible, low-fiber diets. Technologies like accelerometer-based sensors are used to monitor rumination effectively (W. Drochner, M. Tafaj; 2002). Water intake directly impacts feed digestion and nutrient absorption. Proper water availability and quality encourage normal feeding behaviors, especially in hot climates where heat stress can interrupt feeding patterns (Bianca V. Pires, Henrique G.; 2022) ^[51]. Grazing systems like silvopastoral and rotational grazing optimize natural behavior, providing shade and high-quality forage, which enhance both feeding efficiency and welfare (Arthur F., Daniel GG; 2022 Yasid & Edgar; 2022). When compared, feedlot systems often affect feeding and rumination patterns as animals adapt to energy-dense diets and confined conditions. Technological Advances in Assessing Ingestive Behavior include Bioacoustics and Sensors for detecting and quantifying chewing, biting, and swallowing sounds, enabling precise monitoring of feeding behaviors. Accelerometers and noseband sensors are used to automate the measurement of feed and ruminating times in dairy and beef cattle. Techniques reduce labor costs and improve accuracy over conventional observational methods (Jose o & Sebastian R; 2016). Understanding ingestive behavior enables producers to optimize feeding management practices, improve feed efficiency, and ensure animal welfare. Early detection of deviations in feeding routines can act as an indicator of health issues such as gastrointestinal disturbances or heat stress. Research by Pires *et al.* (2022) ^[51] emphasized that key traits like residual feed and water intake are directly related to performance and carcass quality in beef cattle. This highlights the economic and environmental importance of studying ingestive behavior in production systems.

The ancestral ingestive behaviours of modern cattle (*Bos taurus* and *Bos indicus*) are derived from their wild ancestor, the extinct Aurochs (*Bos primigenius*). By studying fossil evidence (especially tooth wear/menswear), historical accounts, and the behaviour of surviving related wild bovids, we can reconstruct a flexible, herbivorous feeding strategy centered on grazing, bulk intake, and adaptation to diverse habitats.

Injunctive behavior in goats

Injunctive behaviors in goats encompass a wide range of activities, including grazing, browsing, ruminating, drinking, chewing, and idle behavior. These behaviors are influenced by a combination of dietary composition, environmental factors, genetic traits, and management practices. Goats have evolved as browsers, meaning they naturally select leaves, small twigs, and forbs over grasses. This adaptability allows them to exploit various ecosystems, including semi-arid and degraded environments. Their grazing behavior is influenced by plant availability, seasonality, and forage quality. A study

on Seasonal behavior by Silva *et al.* (2020) examined the feeding preferences and grazing behaviors of goats in degraded Caatinga ecosystems. Their results showed that goats adapted their feeding strategies according to the availability of plant species during the rainy and dry seasons. During the rainy season, they preferred forbs and shrubs, while in the dry season, they focused on more fibrous plant materials. Hai *et al.* (2013) demonstrated that goats could modify ingestive behavior to adapt to unfamiliar feed materials when exposed to familiar positive cues, reducing the time required to begin consuming novel feed. Goats also do rumination which is a critical component of ingestive behavior and directly affects feed digestibility. This process involves regurgitating partially digested feed for re-chewing, which facilitates the breakdown of fibrous plant material and increases metabolic efficiency. Studies such as the work by Cardoso *et al.* (2021) have highlighted how diet composition, such as water salinity or fiber content, modifies rumination patterns. It was observed that higher fiber diets increase the time allocated to rumination, which is crucial for nutrient absorption. Campos *et al.* (2016) introduced non-invasive surface electromyography (sEMG) to monitor goat chewing activity. This method proved effective in identifying chewing/resting intervals, offering a practical tool for studying rumination dynamics. Goats' feed preferences are often influenced by the fiber content and physical characteristics of the diet. Schultz *et al.* (2019) explored how increasing levels of neutral detergent fiber (NDF) in the diet, along with varying particle sizes, affected ingestive behaviors in dairy goats. They found a significant interaction between fiber content and eating time, with higher NDF levels leading to reduced feed intake rates. Silva *et al.* (2015) reported that substituting peanut cake for soybean meal resulted in changes in feeding and rumination behaviors in confined goats. The study noted that higher inclusion rates of peanut cake led to an increased chewing rate due to the need for enhanced fiber breakdown. Environmental conditions, such as temperature and forage availability, significantly influence ingestive behavior in goats. Studies have demonstrated how goats modify their feeding and drinking patterns to cope with environmental stressors. Araujo *et al.* (2024) evaluated the physiological responses and ingestive behavior of Anglo-Nubian goats subjected to different air temperatures. The findings indicated that as temperatures increased, goats reduced feeding frequency while increasing drinking activity to regulate body temperature. Ferreira *et al.* (2024) assessed seasonal variations in forage composition and its impact on goats' behavior. They observed that goats exhibited different feeding strategies depending on forage abundance during rainy versus dry seasons, emphasizing their ecological adaptability. The rise of technological solutions has enabled more precise monitoring of goat ingestive behaviors, reducing reliance on labor-intensive observational methods. Understanding these behaviors help optimize animal welfare, productivity and makes goat's husbandry a sustainable venture. The ancestral ingestive behavior of domestic goats (*Capra circus*) stems from their wild ancestor, the Bezoar Ibex (*Capra aegagrus*). Their strategy is defined by their nature as a highly selective browser and versatile intermediate feeder, adept at exploiting resources in

rugged, mountainous, and often marginal environments (Dubeuf & Boyazoglu, 2009) ^[26]

Ingestive behavior in sheep

Sheep use their mobile lips, tongue, and lower incisors to grasp forage. (Laves *et al.*, 2023) ^[9]. Ingestive behaviors in sheep are critical for understanding their feeding habits, grazing preferences, and overall nutritional strategies. These behaviors include grazing, rumination, bite mechanics, water consumption, and environmental influence. Sheep exhibit selective grazing, targeting more palatable and nutritious forage species. Grazing involves bite selection based on sward height, density, and forage quality. They adjust bite size and chewing strategies according to the physical characteristics of the forage. For instance, taller swards often result in larger bites but may increase chewing duration due to fibrous material. Yahola *et al.* (2023) ^[63] studied the bite-scale differences in ingestive mechanics between sheep and goats, reflecting the species' adaptation to varying forage structures. Von Keyserlingk and Weary (2010) ^[61] emphasized that sheep prefer high-protein, energy-dense forage and tend to avoid plants with high fiber or anti-nutritional components like tannins. Selectivity helps maintain optimal nutrient intake. As ruminants, sheep do rumination that is essential for effective digestion of fibrous plant materials. The process involves regurgitating feed, additionally breaking it down through prolonged chewing, and re-swallowing. Diets high in neutral detergent fiber (NDF) significantly extend rumination duration. Yahola *et al.* (2023) ^[63] noted interspecies differences, revealing that sheep exhibit specific chewing rates during grazing compared to goats, which impacts their fiber breakdown efficiency. Effective rumination enables sheep to extract nutrients efficiently, making it a critical component of their feeding strategy during periods of lower forage availability. Water intake supports thermoregulation, digestion, and overall physiological processes in sheep. Variations in water intake often correlate with environmental conditions such as seasonal heat stress. According to Von Keyserlingk and Weary (2010) ^[61], sheep increase water intake alongside higher fiber consumption to facilitate the digestion of roughage diets. Accelerometers and bioacoustics devices have been employed to monitor grazing and rumination behaviors without intrusive observation. Yahola *et al.* (2023) ^[63] utilized video monitoring technology to record bite dimensions and placement characteristics, enabling detailed analysis of ingestive patterns under various sward conditions.

The ancestral ingestive behavior of domestic sheep (*Ovis aris*) is derived from wild species like the Mouflon (*Ovis orientalis*). Their strategy is defined by their nature as a highly selective grazer and intermediate feeder, expertly adapted to thrive on varied, often low-quality, mountainous and arid rangelands (Rook & Penning, 1991; Hofmann, 1989) ^[34, 53].

Ingestive behavior in pigs

Pigs primarily use their snouts and lips to gather food. Their highly sensitive and muscular snout allows them to root in the soil and manipulate objects with precision (Smith *et al.*, 2011) ^[58]. The lower lip is especially important in scooping and grasping feed (Frandsen *et al.*, 2009) ^[32]. Ingestive behaviors in pigs are a complex interplay of physiological, behavioral, and environmental factors. These behaviors encompass feeding, drinking and associated actions, including aggression at feeding points. Pigs are omnivorous and exhibit highly

adaptable feeding behaviors suited to their environment, management, and dietary composition. Their behaviors are regulated by various factors. Pigs show preferences for diets rich in carbohydrates and protein over high-fiber feeds. The inclusion of sweeteners can also enhance feed palatability and modify intake patterns (Spector, 2009). A study done by Amaro da Silva *et al.* (2023) ^[10] observe that pigs tend to adopt a diurnal feeding rhythm, with feed intake peaks during the morning and evening hours. Social dominance plays a significant role in feeding behavior, with dominant pigs typically accessing feed first and consuming larger portions (Parois *et al.* ;2016) ^[48]. Experimental findings by Farias *et al.* (2021) ^[28] and Amaro da Silva *et al.* (2023) ^[10] highlight that pigs in air-conditioned environments exhibit more relaxed feeding and drinking behaviors compared to pigs exposed to heat stress, which decreases total feed intake and increases water consumption. Overstocked pens increase competitive interactions, leading to reduced access to feed and suppressing natural feeding behaviors. Genetic factors, such as the monoamine oxidase A (MAOA) gene, have been found to influence aggressive behaviors during feeding (Chen *et al.*, 2017) ^[21]. Research by Han *et al.* (2022) ^[33] and Wurtz *et al.* (2018) shows that pigs in competitive feeding systems display aggressive behaviors, such as pushing and biting, particularly when feed density is low or when restricted feeding systems are implemented. Taste reactivity is critical in guiding ingestive decisions in pigs. Taste characteristics influence the hedonic value of feed, as examined by Flynn (1995) ^[30], who explored how taste-elicited responses in the central gustatory system dictate feed acceptance. Pigs consume water in distinct patterns, often determined by feeding cycles and environmental conditions. Studies highlight the strong correlation between water consumption and dry feed intake, with pigs consuming water immediately following meals to aid digestion (Chen *et al.*, 2022). Water consumption also increases significantly during heat stress as a thermoregulatory mechanism (Amaro da Silva *et al.*, 2023) ^[10]. Pig also displays cognitive and learned ingestive behaviors where they can be trained to associate specific stimuli with feed provision and environmental manipulation can be used to modify feeding behaviors (Zhao *et al.*;2024) ^[64]. Technologies in precision agriculture like accelerometers and ear tag sensors allow continuous monitoring of eating, drinking, and resting behaviors, providing valuable insights into health and welfare (Huang *et al.*, 2025) ^[35]. Chen *et al.* (2017) ^[21] developed algorithms to quantify group behaviors, including aggression and feeding during shared feeding times. The ancestral ingestive behavior of domestic pigs (*Sus scrota domestica*) is rooted in their wild ancestor, the Wild Boar (*Sus scrota*). Their strategy is defined by their nature as a highly adaptable, omnivorous opportunistic scavenger and forager, with a strong drive for rooting. (Scandia *et al.*, 2011) ^[56]

Injunctive behaviors in camels

Camels exhibit a diurnal rhythm in feeding and rumination, consuming hay or roughage for approximately 5.6 h/24 h, ruminating about 8.3 h/24 h, and resting for around 10.1 h/24 h when on a hay-based diet (Kenzie *et al.*, 2005) ^[3]. During rumination, camels regurgitate approximately 67 boluses/hour, and each bolus is chewed for approximately 45 s with around 68 chews per minute; the pause between rumination cycles averages 9 s (Kenzie *et al.*, 2005) ^[3]. The

number of chews per bolus depends on diet fiber content and management: Bactrian camels on a high-fiber diet in semi-intensive management chewed significantly more per bolus than those on lower fiber diets in an intensive system (Sawal, Ranjan, & Nath, 2022) ^[4]. This implies camels adjust their chewing behavior according to diet quality. Camels are selective feeders. When grazing, they self-regulate intake to meet nutritional needs, being able to choose between plant species (e.g., alfalfa vs barley) based on their chemical and physical characteristics (BMC Vet Res study, 2024). In that study, camels had higher forage intake and digestibility when grazing barley compared to alfalfa, showing they respond to plant type and composition. When camels are deprived of food and water, upon refeeding they show distinct ingestive behaviour: they may show preference for roughage vs concentrates, and also prioritise water intake. In one study, behavioural observations during the first hour after refeeding showed time spent drinking, eating roughage, eating concentrates, or resting without ingestive activity (Egyptian camel study, 2019). Camels can feed on thorny, spiny plants e.g., cacti because their mouths are lined with keratinized papillae that protect soft tissues: they chew in a rotating way, and needles are guided down the throat to minimize injury (SVU camel behaviour guide, 2020). Under grazing or browsing conditions, camels may spend 6-8 hours grazing/browsing and another 6-8 hours chewing cud daily, depending on resource availability. According to a study done by Khaskalli A. *et al* in 2020, camels typically feed during cooler parts of the day like the morning and late afternoon in arid environments, reducing heat stress and optimizing foraging efficiency. The ancestral ingestive behaviours of the two camel species the Dromedary (*Camelus dromedaries*) and the Bactrian camel (*Camels Bactrian us* and its wild counterpart, *Camels ferus*) are defined by their extraordinary adaptation to arid and semi-arid environments. Their strategy is one of flexible foraging and maximum efficiency in utilizing sparse, poor quality, and often thorny vegetation (Faye & Bangui, 2018) ^[29]. Camels used a unique highly mobile, tough, and split upper lip to grasp and strip leaves from thorny branches with high precision (Wilson, 1984; Ali *et al.*, 2019) ^[8], allowing them to utilize plants that other herbivores avoid (Schwartz *et al.*, 2021) ^[57]

Injunctive behaviors in horses

Horses use their sensitive lips as their primary tool for pretension. The lips are capable of selectively grasping grasses, leaves, or other forage materials by sorting and manoeuvring food effectively. Their incisors work together with the lips to cut grass efficiently, helping them adapt well to grazing environments (Janis *et al.*, 2010) ^[23]. Equines are natural grazers with long, rhythmic feeding cycles. Feed type and management greatly affect chewing behavior, welfare, and digestive health. Horses spend 10-14 hours/day eating, often grazing continuously and rarely fasting more than a few hours (Griffin, 2019) ^[16]. According to Dietitian *et al.*, 2017 horses have rhythmic, consistent chewing, similar to ruminants, aiding digestion efficiency. Feeding cubes or pellets reduces chewing and eating time, possibly lowering saliva and fiber breakdown (Victoria *et al.*, 2023)). Hay nets or feeders change mouth movements and intake rate depending on pony morphology (Bordin *et al.*, 2023) ^[13]. Restricted feeding can cause cribbing or wood chewing,

linked to stress and poor management (Ellis *et al.*, 2010) ^[15]. However, in starvation horses will eat mud and old dung. When pasture is very short, they ingest soil which can cause excessive teeth wear. Equines digestive system is designed for small but frequent intakes of herbage, but excess amounts of legumes are not suitable for horses. The normal habit of cropping grass is aided by their mobile and very sensitive upper lip. The upper lip forces grass into the mouth and the incisor teeth nip it off. Foals eat faeces within the first 10 days of birth, presumably to initiate cellulose digestion in the colon. (Animal Ethology Book; EU Library). The ancestral invective behaviour of the domestic donkey (*Equus asinus*) is derived from its ancestor, the African Wild Ass (*Equus africanus*). Their feeding strategy is a highly resilient adaptation to extreme marginal, arid, and mountainous environments, defined by their capacity to subsist on poor quality, high fibre forage with exceptional efficiency (Mailman & Kebede, 2022) ^[39].

Injective behaviors in donkey

Donkeys use their mobile lips and tongue to grasp and gather food. Their lips are more flexible and sensitive than those of horses, allowing them to select specific plants and handle thorny or sparse vegetation common in arid habitats. They use an upper and lower incisor set to bite grass close to the ground, often more efficiently than cattle or horses in dry rangelands (Smith & Pearson, 2005). Donkeys are trickle feeders, spending 14-18 hours per day grazing or foraging on fibrous, low quality vegetation. Their narrow muzzle and mobile lips allow selective feeding, enabling them to pick the most nutritious parts of plants (Pearson & Merritt, 1991) ^[49] and (Van Middelkoop & Hendricks, 2001) ^[59]. They exhibit rapid chewing and can adjust bite size and chewing rate based on forage type. They may “sacrifice” fine particle breakdown to maintain intake speed, particularly when eating coarse or fibrous feeds (Mueller *et al.*, 1998) ^[41]. Since donkeys are non-ruminants, mastication is their only opportunity for feed breakdown before digestion; thus, chewing plays a crucial role in nutrient extraction and saliva production (Mueller *et al.*, 1998) ^[41]. When feed access is restricted or competition is high, donkeys may eat rapidly, leading to incomplete mastication and higher risk of choke or impaction (Mueller *et al.*, 1998) ^[41]. Donkeys can exhibit “sham eating”, where they mimic chewing and eating motions without ingesting feed, typically linked to illness or stress (Burden, 2012) ^[20]. As continuous feeders, donkeys require near constant forage access; meal style feeding disrupts gut motility and may lead to colic or hyperlipidemia (Burden, 2012) ^[20].

Injective behaviors in cats and dogs

Cats use their incisors, tongue, and lips to grasp food rather than their paws. Their highly mobile and sensitive tongue helps position food for biting. Unlike dogs, cats rarely use their lips for pretension they rely more on sharp teeth and jaw precision to seize meat (Ewer, 1973); (Bradshaw, 2006) ^[18]. According to a study conducted by Raul *et al.*; 2019 ^[52] demonstrated that domestic cats (*Felis silvestris catus*) display feeding behaviour that stems from specific nutritional

requirements associated to their strict carnivore physiology, such as high levels of total crude protein linked to the presence of specific amino acids in the diet (i.e., arginine and taurine), vitamins A, D, and complex B, as well as arachidonic acid. Usually, cats eat small portions throughout the day mimicking a feeding rhythm pattern that is typical of their wild cat ancestors (*Felis silvestris lybica*), who hunted small sized prey. Cats choose their diets based on smell, taste, temperature, and texture up to the point of self-regulating consumption of certain kinds of foods to ensure an adequate intake of certain nutrients, hence balancing their diets themselves. In this regard, cats are innately drawn to foods with a strong umami flavour, which is typically linked to a high concentration of amino acids. Dogs use their lips, tongue, and teeth to pick up food. Their mobile lips help them grab food from bowls, while the tongue aids in licking or scooping wet food. Unlike herbivores that use lips or prehensile tongues to gather forage, dogs rely primarily on jaw movement and teeth for seizing food (Evans & de Lahunta, 2013) ^[27]. Free ranging dogs employ optimal foraging strategies to maximize nutritional gain. When scavenging in groups, they evaluate food “patches,” sample them, and tend to consume high protein or high value food first, especially under competition. These dogs also display social foraging patterns alternating between cooperative and competitive behaviours based on food abundance and social hierarchy (Nandi *et al.*, 2023) ^[43].

Injective behaviors in chicken

Chickens are omnivorous birds with a unique feeding strategy adapted for pecking, grasping, and mechanical processing of food. They use their beak as the primary organ to pick up food. The beak is highly mobile and sensitive, allowing chickens to peck at, grasp, and manipulate feed particles. Poultry rely heavily on visual and tactile cues to identify suitable food items, often distinguishing particles based on color, size, and movement (Savory & Mann, 1997; Olsson & Keeling, 2000) ^[47, 55].

Injective behavior in rabbits

Rabbits are herbivorous hindgut fermenters with highly specialized feeding and digestive adaptations for processing fibrous plant material. Their invective behavior involves preparation, mastication, and cecography. They use their mobile upper lip and incisors to grasp and pull vegetation into the mouth. Their chisel like upper and lower incisors cut plant material efficiently, while the tongue and lips help manipulate food for chewing (Lebas *et al.*, 2016) ^[38].

Conclusion

After the literature studies on ingestive behaviors were done, it has become very evident that most livestock species have different ways of ingesting feeds, feed preference and behaviour, this will help livestock keepers understand ingestive behaviour and design different feeding practices for different livestock to achieve increased productivity. The table below summarizes the behaviors displayed by different livestock when feeding.

Table 1: Comparative Features of Feeding, Chewing, and Behavioral Traits across Different Animal Species

Feature	Cattle (Bovine)	Sheep (Ovine)	Goats (Caprine)	Horses (Equine)	Swine (Porcine)	Poultry (Avian)
Digestive System Type	Ruminant	Ruminant	Ruminant	Hindgut Fermenter	Mon gastric	Mon gastric (Simple, Short Tract)
Natural Feeding Strategy	Grazer/ Roughage Eater	Grazer/ Selector	Browser / Selector	Grazer/ Continuous Feeder	Omnivore / Scavenger	Omnivore/ Forager/ Granivore
Primary Pretension Organ	Tongue (wraps and pulls)	Lips & Incisors (close grazing)	Lips & Mobile Upper Lip (precise picking)	Lips & Incisors (bite and cut)	Snout & Lips (rooting, grasping)	Beak (pecking, scooping, and sifting)
Initial Chewing (Ingestion)	Rapid, minimal (for bolus formation)	Moderate to Rapid	Rapid to Moderate	Extensive, thorough chewing required.	Rapid (for particle size reduction)	Minimal (swallowed whole/semi whole, relying on the gizzard for grinding).
Rumination (Cud Chewing)	Essential	Essential	Essential	None	None	None
Intake Regulation Mechanism	Primarily physical (rumen fill) and metabolic feedback.	Primarily physical and metabolic.	Primarily physical and metabolic.	Physical fill of the stomach/hindgut and slow, continuous intake.	High initial satiety from rapid consumption, then metabolic.	Primarily visual/tactile selection, regulated by satiety and strong foraging drive.
Grazing/Feeding Time (Daily Avg.) ^[5]	Long (8-12 hours)	Long (6-10 hours)	Long (6-10 hours)	Very Long (12-18 hours)	Short (2-4 hours for actual eating)	Short actual eating time (2-4 hours), but very long time budget for foraging/pecking (up to 60-80% of activity time).
Social Influence on Feeding	Moderate (pecking order at bunk)	Moderate (flocking behavior)	Moderate	Moderate to Low (solitary grazers)	High (social facilitation, group feeding)	Very High (Social Facilitation, synchronized feeding, competitive pecking)
Key Welfare Related Behavior	Decreased Rumination (Disease)	Decreased Rumination (Disease)	Decreased Rumination (Disease)	Stereotypies (crib biting, weaving)	Aggression, Bunk Competition	Feather Pecking, Litter Pecking, Cannibalism (due to redirected foraging/hunger)

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