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Buffalo diseases -a review on aetiology, diagnosis and treatment in the years (2005–2023) and similarly with cattle diseases

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Review Article

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Abstract

There are roughly 150–180 thousand buffaloes in the world. Almost half of the world's population of this kind of mammal lives in India. The buffalo has gained prominence in several emerging nations, like as Egypt, for its production of milk, meat, and draught. Numerous studies have added to our scientific understanding of the diseases that affect cows and buffalo. studies on nutrition, reproduction, physiology, and production. Many diseases affected buffaloes has been conducted in many countries such as north and south African and Egypt. Nevertheless, the pathophysiology of these animals has received less attention. This most likely happened as a result of the widespread belief that cow and buffalo diseases are the same, and that buffaloes have a high level of tolerance to certain diseases. However, the literature shows that while the etiological agents of infections, infestations, deficits, and injuries are actually the same for both animal species, there are differences in the prevalence, pathogenicity, and symptomatology of a buffalo pathologic condition. As a result, clinical approaches used for buffalo illness diagnosis, prevention, and control differ somewhat from those used for cow diseases. This essay discusses the main health issues that cause buffalo to lose money. at last ten years in Egypt.

Every study addresses the frequency of diseases affecting Egyptian buffalo. The primary search engines and indexing services used for the literature search were PubMed, Google, Google Scholar, and Science Direct. It was also found that unpublished MSc and Ph Sc theses might be retrieved from university repositories. 15,515 buffalo from 70 reports in total were considered in this analysis. A prevalence estimate for the age group, sex, herd size, and animal composition of buffaloes considered as potentially significant determinants for illnesses, gathered from the literature from 2005 to 2023.Animal composition, age group and sex of buffaloes identified as potential significant factors for diseases

Keywords: *Buffalo, FMD, Egypt, cow*

Main body

Buffalo especially The original home of Egyptian buffalo was in neighboring nations like India, Iran, and Iraq. Some modifications around the 7th century indicate that buffaloes have become an essential component of home life and the economy. For centuries, they have supplied meat, milk, and leather. Beyond geographic location, there is little difference between buffalo. The horns of the Egyptian buffalo resemble lyres or swords, and its hide is a dark grey color **Abubakar *et al.* (2010**). Regarded as having a long head and drooping ears.

The tail can be positioned low because to the body's broad, wide ribcage and rump's downward inclination. Buffalo gives about 1200 kg of milk on 280 days of production per year.

The Nile Delta and regions with a mix of rural and urban landscapes are the best places to find buffalo **Adediran *et al.* (2014)**; **Abdela, (2017)**; **Abunna *et al.* (2013**). It has been shown that buffaloes thrive in the agro-ecological conditions and climate of Egypt. Their resilience helps farmers weather economic shocks as well as the effects of climate change. Still, the bulk dairy market has not come to appreciate the superior quality of their tasty meat and dairy products **Ayelet *et al.* (2009**). The river type includes Egyptian buffaloes (Bubalus bubalis). They were transported from India, Iran, and Iraq to Egypt in the middle of the 7th century **Halmandge *et al.* (2005**). Their ability to adapt well to humid hot climates **Bilal *et al.* (2009**), their tolerance to various diseases and parasites **Baillier Tindall *et al.* (2008**) and their skill in using low-quality roughage **Lassen *et al.* (2017**) are what distinguish them. Additionally, Egyptians prefer the high-fat milk that buffaloes produce over the bovine one. Furthermore, Egypt is the largest nation in Africa, home to roughly 3.9 million buffalo heads **Daugschies and Najdrowski. (2005**). Dairy cows make up about 42% of the buffalo population, followed by male calves (20%), heifers (32%), and bulls (6%). Because they supply 44% of milk and 39% of red meat to the local market, buffaloes are essential to the food security of the area (9,6,7).The majority of Egyptian buffalo—roughly 97% of them—are reared in small herds. **FAO (2011**) under the Ministry of Agricultural and Land Reclaimed's license for the traditional mixed crop/livestock farming system, which is the primary livestock farming system in Egypt **Kennedy, (2006**). Buffoles could be afflicted with viral, parasitic, bacterial, or other illnesses.

Bacterial illnesses

Brucellosis

People often believe that buffaloes are less likely than cows to contract *Brucella abortus* WWl. However, in several nations, including Egypt **Aman *et al.* (2020**), Italy **BROWN *et al* (2005)**, **Chichester Brito *et al.* (2018**), Brazil **Beyene *et al.* (2015**), Pakistan **Belina *et al.* (2009**), and India **Awel *et al.* (2021)**, **Baillier Tindall *et al.* (2008**), brucellosis has been identified as one of the most significant buffalo zoonotic diseases. Due to its link to abortion, placenta retention, and infertility, brucellosis has a negative economic impact on the production of buffalo.

Given the presence of Brucella antibodies in the blood serum, the diagnosis of brucellosis is questionable and requires additional research. **Aleksandro Schafer Da Silva *et al.* (2013)**, **Bangoura *et al.* (2011**) state that erroneous positive results come from the card test and false negative results come from the tube agglutination test. In terms of accuracy, the Rivanol test seems to be better than the others. The counter-immune electrophoresis test is better suited for diagnosing brucellosis in buffaloes, per **Azeb, (2015)**; **Bilal *et al.* (2009**). Since there isn't a recognized practical treatment that works, control and prevention measures are taken.

Buffaloes are frequently vaccinated with *B. aborts* Strain 19, which increases their resistance to infection. Animals that receive vaccinations often develop cellular immunity, or infection resistance, for eight to ten years. In some places, a different vaccination, *B. aborts* 45/20 bacterium in adjuvant, has become widely used. According to **Halmandge *et al.* (2005**), this vaccine may develop protection.

Tuberculosis

Similar to cows, buffalo were also susceptible to *Mycobacterium bovis*. But in some nations, the sickness that affects buffaloes is less common; this could be due to their wide range of living situations **Harpreet and Daljit (2008)**, **Kaur, (2008**). A few environmental factors that contribute to the spread of tuberculosis are damp buildings, cramped living quarters for multiple animals, and inadequate ventilation in stables. The tuberculin test reveals a higher level of non-specific allergic sensitivity, most likely as a result of the locals' propensity to wallow in mud and the presence of more M bovid-like bacteria in the area.

As a result, in cases of dispute, simultaneous tuberculin testing (mammal and avian PPD) is documented. Because the intensity of the reaction was far higher than what is typically observed in cows, the tuberculin test interpretation for cattle based on standard protocols is inaccurate. The mammalian tuberculin reaction in the buffaloes' positive reactors was hot, oedematous, and painful. The edema is more

widespread.
buffalo tuberculosis lesions were more frequently located in the retropharyngeal and mediastinal lymph nodes, according to **Liu *et al.* (2009**) and **Muraleedharan, (2005**) who observed that there was no effective treatment for buffalo tuberculosis aside from the anti-tuberculosis medication isonicotic acid hydrazine.

Hemorrhagic septicemia

Although there is a lack of quantitative data, it is generally accepted that buffaloes are more prone than cattle to hemorrhagic septicemia caused by
Buffaloes are severely affected by the disease, particularly in Japan, Philippines, Indonesia, Malaysia, and India, Ceylon), and Japan Low occasional prevalence is recorded from certain European States. In addition to the URSS. Numerous South American states have also claimed endemic status; however, no reports of the disease in combination with serotype identification have been made. Poor husbandry techniques are the main cause of this disease's prevalence. is typically linked to humid, rainy weather, and the wet season is when it occurs more frequently. The majority of nations acknowledge that animals younger than two years old have greater rates of morbidity . The first noticeable signs in a typical pasteurellosis disease are subcutaneous oedema and serogelatinous fluid, especially in the brisket and submandibular neck areas. There could be enlarged lymph nodes and petechial hemorrhages dotted throughout the subcutaneous connective tissues. There's little use in treating once symptoms become apparent.
The only realistic course of action is to start treating as soon as a temperature elevation is seen. Antibacterial therapy is working at this point. Both intravenous sulphadimidine and intramuscular broad-spectrum antibiotics are practical and efficient. Vaccines of several kinds are employed. Currently, the most commonly used vaccinations are those that are aluminum hydroxide gel and alum precipitated. Most people aim for four months of immunity at six months. bladder infections and mastitis
Although the prevalence of mastitis in buffaloes is somewhat lower than in cows, it is a significant economic problem that dairy buffalo farms must deal with. Buffaloes' teats are longer and more pendulous than cows', making them more prone to injury. However, compared to cows, buffaloes' teat sphincters have more smooth muscle, blood arteries, and fibers, which may act as a stronger barrier against infections. The majority of cases of subclinical mastitis afflicted buffaloes. The Modified Whiteside Test, California Mastitis Test, and Chloride Count are the most suitable assays for identifying subclinical mastitis in buffaloes. For the pre-detection of udder c1inical infection, these assays fall short. Nonetheless, their inclusion in the standard assessment did aid in identifying the animals that were most likely to have matins **Ayelet *et al.* (2009**). Latent mastitis in buffaloes is mostly caused by two organisms: *streptococci* (21.13%) and *staphylococci* (74.71%), according to A full recovery is achieved after intramammary treatment with the proper antibiotic. The evacuation of secretions from the afflicted area is the most crucial element in a successful mastitis treatment, and it must be done completely and nearly continuously.
Black leg the illness that Clostridium chauvoei causes. Usually happens in places with flooding and marshes, as well as rainy stations. The majority of occurrences affect animals between the ages of 6 and 18 months, while isolated cases have been reported in calves as young as 6 weeks. Emphysematous swelling in the heavier muscles was a defining feature of the symptoms. In most cases, blackleg appears on its own in the best buffalo in the group.
There are outbreaks where a few cases are discovered every day for a few days. Black leg is suspected when well-fed young animals have a quickly lethal febrile illness accompanied by crepitate swellings of the massive muscles. The damaged muscle is spongy, dry, and dark red to black in color. It also smells slightly sweet. Most of the time, the illness ends fatally 12 to 36 hours after the symptoms first show.
In order to maintain control, calves should receive two vaccinations at two and six months of age. In high-risk locations, a re-vaccination may be required a year later. Large doses of penicillin may be tried for the treatment of clinical instances.

Parenteral

Leptospirosis

Because buffalo dairy herds are becoming more intensive in many countries, the illness has become more significant economically. In older buffaloes, the disease is typically asymptomatic and is caused by one or more leptospiral serotypes, primarily *Leptospira pomona*. On the other hand, prostration, anorexia, hemoglobin uria, anemia, and icterus are the signs of the acute form. Urine-contaminated feed or water can also spread naturally through contact with urine. Treatments of any kind will not significantly slow the progression of the illness.

PARASITIC DISEASES

Ascariasis

caused by the big, spherical intestinal worm Toxocara (*Syn. Neoascaris*) vitulorum. It is the most prevalent and harmful parasite that infects newborn buffalo calves. In nations like Pakistan, Ceylon (**Abunna *et al.* 2013**), India (**Abubakar *et al.* 2010**), Malay (**Adediran *et al.* 2014**), Egypt (**Ahmed *et al.* 2008**), Philippines **Alemayehu *et al.* (2013**), Thailand **Ali *et al.* (2017**), and Brazil **Aman *et al.* (2020**), it is the primary cause of buffalo calves' deaths. The majority of patent infections occur in calves less than three months. The morbidity and mortality rate in this age group in uncontrolled buffalo herds frequently approaches 100% and 40%, respectively.

After that, it drastically decreases and infections in animals older than six months become uncommon. Many writers **Ayelet *et al.* (2009**), **Ayelet *et al.* (2012**), **Awel *et al.* (2021**), **Azeb, (2015**), **Aleksandro Schafer Da Silva *et al.* (2013**), **Baillier Tindall *et al.* (2008**), and **Bangoura, *et al.* (2011**) have claimed that trans mammary infection is the typical way that buffalo calves contract the disease. Prenatal infection was described by authors **Abubakar *et al.* (2010**) and **Belina *et al.* (2009**) referring to the infectious larvae found in colostrum that spread from cow to calf. When larvae found in ammniotic fluid are consumed by the fetus, the animals become very malnourished and thrifty. swollen, wet faces with collars, erratic breathing, anorexia, convulsions, and coma.

The main reason for mortality is intestinal system blockage brought on by adult worm balks. Certain authors **Beyene *et al.* (2015**), **Bilal *et al.* (2009**), and **BROWN *et al.* (2005**) have linked the death of paradise animals to coliform, or *Escherichia coli.* The larvae infect calves through the dam, hence the control approach depends only on the routine deworming program. But when it comes to preventative measures, cleanliness is crucial **Chichester *et al.* (2018**) have indicated on an appropriate deworming regimen in buffalo calves before they are weaned at l S, 30, 60, and 180 days old, orally.

Coccidiosis

In Ceilon **Cicek *et al.* (2007**), India **Daugschies and Najdrowski. (2005**), Italy **Dedrickson, (2006**), and Brazil **Duval, (2000)**), there has been a high death rate among buffalo calves infected with *Eimeria species* (*E. zuernii, E. bavis, E. auburnensls, E. ellipsoldalts, and E. bareil1y*). Commonly affecting young buffalo between the ages of one or two months and a year is coccidiosis, particularly in herds kept in unhygienic conditions.

The illness is typically more common in the winter **Elshrawaym and Mahmoud (2017**) or in the dry season **Duval, (2000**). The colon, cecum, and lower small intestine mucosa may sustain harm due to the pathogenic coccidian. The main defining feature of mild infections is wet faces with little to no visible blood. Animals with severe symptoms may experience thin, bloody feces or thin faces with clots of blood, mucus, and epithelium shredded.

The buffalo loses weight, loses its hunger, gets unhappy and dehydrated, and its tail and hindquarters get dirty from excrement. Death could happen in the acute phase. Good management, proper feeding procedures, and adherence to animal cleanliness guidelines are the cornerstones of the prevention of clinical coccidiosis. Sulfonamide treatment produces good outcomes in the fight against coccidiosis.

Trichostrongyles nematodes

There have been reports of parasitic gastrointestinal infections in buffaloes caused by *Trichostrongyles nematodes* in India Yugoslavia Australia **Halmandge *et al.* (2005**), Egypt **Harpreet and Daljit (2008**) and Brazil **Kardjadj, (2017)**; **Jäger *et al.* (2005**). The classic image of gastrointestinal parasitizing in buffaloes has

long been described as subclinical infections with ensuing stunting and thriftiness. Since *Haemonchus contortus* and *Trichostrongylus axei* are the two most significant stomach worms, losses from these parasites have happened more frequently in young animals than in adult ones. Cooperia punctata and common Bunostomun plebotomun are found in the small intestine. *Oesophagostomum radiatum* is more common in the large intestine. The most notable symptoms of this illness include anemia, anorexia, weakness, diarrhea, dehydration, and gradual weight loss.

In order to prevent the buildup of crippling infection, the entire herd must be treated for preventive control at specific times of the year. The timing of these regular treatments should be decided based on the particular herds and the local conditions. Buffaloes that survive in the marshy regions of the Amazon region do not experience helminthesis, most likely because the immersion in water and oxygen deprivation can prevent nematode eggs from developing. Sufficient nourishment plays a crucial role in managing parasitic gastrointestinal disorders by fortifying animals' resistance against parasites and the consequences of parasitic infections **Mooser *et al.* (2018)**.

Fascioliasis

According to Griffiths **Nguyen *et al.* (2017)** the buffalo is heavily infected with *Fascicle species* (*F. hepatica; F. enormous*) in its natural habitat, where the snail vectors of trematode parasites are likely to occur in considerable numbers. Fascioloasis causes high economic losses in many nations, including the Philippines Egypt, Singapore, Turkey, Taiwan , Brazil, Iraq, Pakistan and India. These losses manifest as decreased milk production, low body weight, poor carcass quality, and liver condemnation. A favorable relationship between disease incidence and morning minimum temperature and rainfall as well as humidity in the evening have been noted. The incidence was more commonly noted in mature buffaloes younger than two years old. Fascioloasis was reported in Brazil's southern regions, but it was essentially nonexistent in the country's northern region (Amazonian), possibly due to the necessity for a multifactorial system made up of hosts, parasite agents, and transmission processors **Mulatu *et al.* (2020)**.

Pediculosis Lice infestation

resulting from the sucking louse Throughout the world, *Haematopinus tuberculatus* is the most dangerous bovine ecto parasite illness, with cases reported in Brazil, Egypt **Klockiewicz *et al.* (2007)** Argentina, Pakistan, India, and Pakistan. The sort of dairy farm—unhygienic farms—determines the infestations more than anything else. The infestation of lice reduces milk output and slows the growth of dairy animals. Generally speaking, calves have more lice than adults.

Large infestations of this parasite contribute to unthriftness, irritation, and concern caused by their continual presence on the body and their bites. Herds are typically not homogeneous; certain animals are extensively afflicted. The host doesn't seem to be suffering too much from the blood loss. The mature female deposits a vast quantity of eggs affixed to the animals' thin hairs **Lassen *et al.* (2017)**. There are essentially no louse infestations in any other **Mengistu, (2016)**. The louse population in the tropics is restricted by the sun, the warm skin temperature, and the dry season.

The most common way for a virus to spread from one host to another is through contact. In a study using Trichlorphon washes, **McKellar, (2008)** found excellent results. There were to be two lines of therapy; the first killed all adults and nymphs, and the second, administered eighteen days later, killed all lice that were hatching. A subcutaneous dose of 0.4 mg of ivermectin per kilogram of live weight also showed improved results in the management of this ectoparasitic illness.

Acariasls Mange

It has long been known that the genus Sarcoptes causes a widespread dermatological issue in buffaloes in India **Mengistu, (2016)**. Buffalo's general health, growth, and productivity are typically affected by mange, but in cases of severe infestations, particularly in young animals, the disease may be lethal **Mulatu *et al.* (2020)**. Confined annuals and animals under the age of a year are more likely to contract the sickness. Variations in the surrounding temperature impact the frequency of

The frequency of mining temperature is higher. The incidence level is unaffected by relative humidity. Numerous papules are present in mange lesions, which are followed by the development of hemorrhagic crusts **Li *et al.* (2014**). Hair began to fall out. The lesions were mostly seen at the base of houses and in the area near the ear. This could be due to buffaloes' natural tendency to wallow in water.
Somebody has argued that body parts that are above the water line while wallowing. Nevertheless, the legs, ventriloquin, and dorsum also exhibit lesions. The treatment involved spraying insecticides, as documented in Proceedings IVth World Balliol Congress, VaI. I São Paulo, Brazil - 1994 211 **Nalbantoglu *et al* (2008**) and **Kobak and Pilarczyk, (2012**). Since the mite develops from an egg to an ovigerous female in 10 days **OIE (2021**), three applications were found to be necessary at weekly intervals, as one or two applications did not result in complete eradication.

Trypanosomiasis
Trypanosome Evans has been found to infect buffaloes in India and Brazil with *T. vivax.* In most cases, buffaloes have latent infections with no symptoms. *Turbaned* flies have an advantageous ability to spread disease inside the natural habitat of buffalo in marshy and swampy land locations. The initial signs of the infection were a fast-moving, increasing emaciation accompanied by despair and anemia. The rear quarters wobble back and forth as the pasterns knuckle. The temperature varies significantly every four to five days, yet it is high at certain points. Another typical sign is oedema of the eyelids combined with mucopurulent conductivities.
There is sometimes blood and albumin visible in the turbid, yellow urine. The illness typically has a chronic course that lasts one to six months. Fly bites and sucking lice are most likely the only ways that the sickness spreads from one animal to another. Treatment involves isolating individual individuals while administering injections of either Berenil at a rate of O.8/100 kg body weight **Shome *et al.* (2015**) or Diminazene and Oxytetracicline **Seyoum and Tora Bulletin (2023**).
Several filarial worm species, including Setaria, Stephanofilaria, Onchocerca, Parafilaria, Eleophora, and Thelazia, have been documented to have flea-borne infections in buffaloes in a number of countries, including Egypt **Wagari, (2016)**, Brazil **Taylor *et al.* (2007**), India **Singh *et al.* (2019**), and the Philippines . The variety of clinical signs is consistent with the type of parasite. The most typical symptoms are aortitis, bursitis, and dermatitis. Nodular and hemorrhagic cutaneous eruptions are common in Parajilaria bovtcota's buffaloes paradise. The prepuce, groin, and axilla are where the nodules typically develop. The treatment of filariasis involves the use of numerous medications, such as ivermectin, detrain, sulphoxide thiabendazole, azinidine, berenil, and chlorophos. Vectors like lice, mosquitoes, and tabanids are responsible for the transmission **SONULE *et al.* (2011**).

Home of the various species of flies
that infected and harm The members of the buffalo family are bloodsuckers whose bites can be painful and annoying. Brazil is currently home to the home fly, Haematobia in tansi, which was brought to South America via Colombia. is the major issue facing the herds of buffalo.
During the fly-bearing season, house flies can cause significant losses due to their bothersome and irritating nature. Buffaloes frequently refuse to graze during the day and instead seek cover by handing in brush or tall grass until dusk, when the flies are less active. This interferes with the hosts' ability to feed, relax, and engage in other regular activities. Marajó Island is home to large parasite populations.
The fly was drawn to the buffalo's black appearance, but it seemed that the animal stench drove the parasite away. greater frequency at the start and finish of the rainy season. Essentially, spray pesticides are used for control. **Soulsby, (2006).**

VIRAL DISEASE
Foot and mouth disease
Specifically, foot and mouth disease (FMD) is the most economically significant transboundary viral illness of ruminants affecting cattle at the national, regional, and individual producer levels. It makes it more difficult for

the country to engage in foreign trade and make money from cattle **Wagari, (2016)**, **Woji *et al.* (1994**). This is due to the extreme contagiousness and severity of the foot-and-mouth disease (FMD) virus that affects all animals with cloven hooves. Thus, it acts as a productivity and production bottleneck by imposing trading limitations on live animals and the products derived from them **Singh *et al* (2019**). On list A **Kobak and Pilarczyk, (2012**) of the World Organization for Animal Health, FMD is the most common infectious disease affecting animals. The virus that causes FMD is categorized under the genus Aphtha virus, which is a part of the Picornaviridae family.

The symptoms of an FMD virus infection include fever, loss of appetite, salivation, vesiculitis in the coronary bands of the foot and teats, vesicular eruptions in the mouth mucosa, and the abrupt death of calves (**Himmelstjerna *et al.* 2006**).

Seven serotypes of the FMD virus have been identified through immunological testing: O, A, C, Asia 1, Southern African Territories (SAT)-1, SAT-2, and SAT-3 **Lassen *et al.* (2017**). Because the virus mutates so frequently, immunologically, several subtypes are separated with unique antigenic and genetic characteristics **BROWN *et al.* (2005**). A distinction exists between the global distribution of the seven virus serotypes **Zerabruk *et al.* (2014)**; **Soulsby, (2006**). Five of these serotypes—A, C, SAT-1, SAT-2, and O—have been identified in Ethiopia **Abdela, (2017)**.

Furthermore, multiple bio-typical strains and top types exist within each serotype, which can be identified using genetic and serological testing; infection with one serotype may not confer protection against other strains **Soulsby, (2006**). Significant financial losses have been attributed to serotypes O and A in Ethiopia's and Egypt's livestock industries **Dedrickson, (2006)**, **Gelana *et al.* (2016)**; **Muraleedharan (2005**).

Buffaloes typically have a milder version of the disease than cattle. The age, vaccination history, virus virulence, and other stressors such as malnourishment all affect the animal's susceptibility. Buffaloes usually heal rapidly from this disease, even if the mouth lesions may be more serious than those on the foot. The disease's clinical symptoms were similar to those commonly observed in cattle.

In extreme cases, the buffaloes developed oral fevers, started to sink in the water, and struggled to eat because of a quick loss of flesh. The affected buffaloes may see a marked decline in milk yield. Secondary bacteria may be able to enter the broken vesicles, particularly on the feed. There is variation in the incubation period, which usually lasts three to six days. Rarely, it may take up to eighteen to twenty days for it to appear. Chemically inert vaccinations produced from a virus that is raised in cattle and suspended in an adjuvant have proven quite effective in certain countries. As stated in **SONULE *et al.* (2011**) buffaloes may appear to be completely healed from FMD infection, yet many animals usually harbor the virus for

The prevalence of foot and mouse disease at the national level significantly reduces trade prospects, which slows down the development of income **Cicek *et al.* (2007)**, **Elshrawaym and Mahmoud, (2017**). When outbreaks afflict draught oxen during the cropping season, small-scale mixed agricultural systems suffer significant losses. FMD also significantly reduces the weight and milk yield of dairy and fattening cattle, respectively. Milk is a staple meal in rural households, especially for children **Li *et al.* (2014**). while feed and water are scarce during dry spells or while cattle are young, there is a heightened risk of FMD-related death and suffering. Furthermore, the existence of FMD acts as an operational blockade because a country's FMD status has a significant impact on international trade in animal products.

Rabies

Buffaloes in enzootic zones occasionally contract the disease. Almost all buffalo rabies cases are spread by the vampire bat (Desmodus rotundus), which carries the infection through its saliva. The vulva region and the area around the eyes are the most typical places to get bit. Typically, symptoms do not match the description of enraged rabies. Buffaloes typically exhibit ataxia or incoordination, as evidenced by their wide-based foreleg posture, Tympani, teeth grinding, anorexia, and constipation. Buffaloes often displayed symptoms 20 to 25 days after infection; annual vaccinations were ad-

ministered to all animals to prevent death quickly following infection.

Buffalo Pox

It appears that the illness is unique to buffaloes, as pandemic cases have been documented in a number of nations, including Pakistan **Ali *et al* (2017**), Indonesia, India **Ayelet *et al.* (2009**), and Italy **Awel *et al.* (2021**). Because of its close clinical relationship to cow-pox virus infections, WilB is thought to be caused by cow-pox viruses **Aman *et al.* (2020**). Since humans contract the disease through contact with infected animals or materials, it is zoonotic in nature. While the classic pox lesions are found on the teats, udder, and around the nose, the generalized form of the disease causes lesions in various stages to appear all over the body. A common outcome of this infection is mastitis, stenosis of the milk ducts, and teat thickening **Ahmed *et al.* (2008**).

Despite the fact that many researchers view the illness as economically driven, no effective control measures have yet been developed. Developing a viable vaccination and conducting epidemiological studies are necessary before developing a control strategy. **Abdela, (2017**) states that full recovery is achieved with therapy with consistent antiseptic and antibiotic dressings.

Cutaneous papillomatosis

The condition, which is widely distributed and has significant economic significance, at least for the hide industry, is called warts. It has been determined that viruses are the cause of buffalo warts. Buffalo papillomas frequently appear in the shoulder, chest, and neck regions. These are often considerably softer and have an abundance of blood vessels. They frequently have stems or pendecula. They are hazy gray or greyish-brown in hue. Their level of consistency varies. In certain cases, traction, ligation, or surgery are not practical treatments for buffalo skin
papillomatosis.

The auto-haemotherapy treatment showed a good response in curing papillomatosis, however the spontaneous recovery was slightly delayed for as long as 18 to 24 months.

REPRODUCTIVE DISORDERS

There have been reports of several reproductive abnormalities in both male and female buffaloes **Abunna *et al.* (2013)**, **Ayelet *et al.* (2012)**, **Daugschies and Najdrowski, (2005)**, **Aleksandro Schafer Da Silva *et al.* (2013)**, **Baillier Tindall *et al.* (2008), and Sajid *et al.* (2016**). Most of the anomalies are fictitious and physical, and they are typically seen in female animals. The most frequent obstetrical issues in pluriparus buffaloes are vaginal prolapse and placenta retention. Cervico-vagino vulvar lesions and dystocia are the main issues in primiparus buffaloes. Infertility and methylation are the prevalent aftereffects of these reproductive diseases. Dystocia is typically caused by the fetus's aberrant posture or position (56.62%), uterine torcion (22.72%), caquexia (9.64%), and embrio pathies (6.02%). During the rainy season, the frequency of retained placenta was highest. For the first time, there was a noticeably greater rate of stillbirth among buffalo calves. The incidence of several calving diseases was influenced by the sex of the calf. Heifers giving birth to male calves had a considerably greater incidence of stillbirth, dystocia, and uterine prolapse.

MINERAL DISTURBANCE

Lack of phosphorus has a greater negative impact on buffaloes living in severely deficient locations than it does on calories and protein. Lameness, swollen joints, limited growth, and excessive proliferation of unqualified bone are the symptoms of a phosphorus shortage, according to **Zajac, A.M. and G.A. Conboy. (2006**). Caquexia (100%) and anorexia (84%), bristling and drab hair (78%), claudication (34%), sustenance in the carpal articulation (23%), kyphosis (17%), and allotrophagy (6%), which results in ingestion of wood, mud, and pebbles, are the often encountered field conditions. Low conception rates and anestrus may occur. The milk's phosphorus content doesn't decrease. In buffaloes, calcium insufficiency is rarely seen.

The productivity and health of buffalo are affected by a basic mineral mixture that contains macronutrients like phosphorus, calcium, sodium, potassium, and chloride and micronutrients like copper, zinc, fluorine, iodine, and manganese.

POISONOUS PLANTS

This source most likely poisons more animals than all other sources combined. Lack of more appetizing diet, letting hungry animals graze in regions with deadly plants, or carelessly leav-

ing poisonous plant material behind can all lead to plant poisoning. In the Amazonian region, **Soulsby, (2006)** reported that buffaloes intoxicated by Pithomices chart arum and Lantana camera experienced significant photosensitization. The animals also displayed anorexia, regressive emaciation, jaundice, and discomfort. Numerous fatalities in buffaloes inebriated by Arrabidaea bilabtata have also been reported.

According to **Khan *et al.* (2013**), buffalo intoxication caused by Mimosa invisa (Var. inermis) was reported. 111e poisonous components of this plant are cyanide and nitrite. The symptoms include salivation, rigidity, lack of agitation, muscle tremor, dyspnea, and death after the animals had gone recumbent.

CONGENIT AL ABNORMALITIES

Not every congenital deformity in buffaloes is caused by genetics. Toxic substances, other environmental variables, and maternal nutritional deficiencies have also been linked to them. may impact a single bodily system or structure, or it may include many body systems. 01' integrate functional and structural changes, Could be non-lethal, semi-lethal, or deadly. Musculoskeletal (53.7%) is the bodily system that is not affected. Anathema, brachygnaíhia, prognathia, arthrogryposis, spastic paresis, and hemia umbilical are among the prevalent abnormalities. The three main flaws in the immune system are albinoidism, photosensitivity, and hypotricosis.

Table (1). Study articles comprised in an-analysis of buffole diseases

Author publication year	Year of study	Viral Diseases %	Parasitic Diseases %	Bacterial Diseases %
Abdela (2017)	2016	28.2	21.1	14.2
Arzt (2018)	2017	25.31	18.5	15.2
Ferid *et al.,* (2012)	2011	26.2	20.5	11.5
Mooser *et al.,* (2018)	2017	27.5	19.5	18.8
Khurshid *et al.,* (2021)	2020	28.1	17.3	12.4
Ali *et al.,* (2017)	2016	24.2	21.7	12.58
Zerabruk *et al.,* (2014)	2013	25.9	21.8	14.8

Table (2). Vital values comparsion between buffoles and cattle's

Parameters	Buffole	Cattle	References
Normal temperatre	**38.2**	**38.5**	**Kardjadj 2017**
Respiratory rate	**8-20**	**10-20**	**Ali *et al.,* 2017**
Pulse rate / min	**40-60**	**50-80**	**Shome *et al.,* 2017**
Hb G/Id	**11.5-15.5**	**8-14**	**Kobak and Pilarczyk 2012**
RBCs (T/I)	**6-8**	**5-10**	**Li YS *et al.,* 2014**
WBCs G/I	**7-9**	**4-12**	**Ayaz *et al.,* 2014**
PCV%	**32-52**	**26-42**	**Abunna *et al.,* 2017**

Conclusions

Since buffalo diseases are trans-boundary illnesses, they have an impact on the export of live animals and their products and are common in buffalo. Thus, it is essential to strategically develop strong eradication, control, and prevention programs. When compared to adulthood, the prevalence of buffalo illnesses in newly borns is significantly higher. The buffalo herd was more frequently affected by viral diseases than by bacterial, parasitic, and other illnesses. There is more resistance to bacterial, viral, parasitic, and other illnesses in buffs compared to cattle herds.

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