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Investigation of the prevalence of coccidiosis in broiler chicken farms in Mazar-e-sharif city

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Abstract

Coccidiosis is a major parasitic disease affecting poultry production worldwide and has been reported in most countries with varying prevalence rates. This disease is caused by various species of Eimeria parasites, which primarily damage different parts of the chicken's intestines. This study aimed to assess the prevalence of coccidiosis in poultry farms located in Mazar-e-Sharif, Afghanistan. A total of 18 poultry farms were examined through clinical observation and laboratory diagnosis. The results revealed that 16.4% of the farms had chickens infected with coccidiosis, indicating a relatively low of infection in the region. Chickens between 2 to 8 weeks of age exhibited the highest infection rates. Seasonally, the highest

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prevalence was recorded during winter (40.7%), while the lowest was observed in summer (11%) And male chickens showed more contamination than female.These findings highlight that need for improved management and preventive measures to control the spread of coccidiosis in local poultry production systems.

Keywords: broiler chicken, coccidiosis, Mazar-e-sharif, parasitic disease

1.Introduction

Worldwide, poultry is the main source of animal protein (Nkukwana, 2018; Govoni et al., 2021). There will likely be nine billion people on the planet by 2050, producing safe and sustainable protein is of utmost importance (Tripathi et al., 2019). Because birds are housed together in huge numbers and at high stocking densities in intensive systems, stress levels and illness prevalence are higher (Ahmad et al., 2022). Thus, any illness that reduces the efficiency of the previously indicated production mechanism could endanger the whole food chain (Aganovic et al., 2021). Numerous parasite infections, also known as "hidden foes" impact the chicken industry and have the ability to cause long-term losses without exhibiting obvious clinical symptoms (Blake et al., 2020).

Coccidiosis is a parasite disease that affects hens and the annual expenditures of coccidiosis are estimated to be around USD 127 million in the United States and 73 million in China (Geng et al., 2021; Lahlou et al., 2021).The most significant of Eimeria species linked to coccidiosis in chickens is E. tenella, which is seen in broilers. E. mitis, E. maxima, E. necatrix, E. praecox, E. acervuline, E. brunitti, E. maxima, E. praecox, and E. necatrix are the others. Regarding pathogenicity, they are all distinct, and they all affect various intestinal segments (Kers et al., 2018). Eimeria infections, which infiltrate and multiply within intestinal epithelial cells, can lower productivity and jeopardize the welfare of chickens in layer and broiler systems, necessitating comparatively expensive therapies. It is estimated that the annual cost of these interventions plus infection-related losses to the worldwide chicken business exceeds £2 billion (Dalloul and Lillehoj, 2006). The subclinical and clinical symptoms of coccidiosis are directly caused by the impairment of protein digestion and absorption caused by Eimeria infection.

Prevention of coccidiosis is crucial for fostering the poultry industry's significant expansion and safeguarding its revenue streams (Hamid et al., 2018; Yang et al., 2020). However, depending on the infecting Eimeria

species, dose schedule, and chicken breed, different numbers of parasites and infection rounds are needed to produce immunity that is adequate to prevent disease (Rose, 1963; Brake et al., 1997; Blake et al., 2005; Boulton et al., 2018). Immune defense against challenge infection with a heterologous species is minimal or nonexistent and even infection with a different strain of the same species can occasionally evade immune defense (Joyner, 1969; Blake et al., 2011).

As a result, even though live Eimeria oocyst vaccination is efficacious and has served as the foundation for live oral coccidiosis vaccines for nearly 70 years, chickens need to receive vaccinations with oocysts from every species of Eimeria to be completely protected. Since each vaccine line must be propagated independently in chickens under strict, pathogen-free conditions, the requirement that a live vaccine contain controlled doses of oocysts for all pathogenic species of Eimeria, and in some cases, multiple strains of Eimeria maxima, makes vaccine manufacture logistically challenging. Another crucial factor to take into account is that in order to produce levels of protective immunity adequate to shield chickens from pathogenic challenge by the majority of Eimeria species, fecal-oral recycling of vaccine parasites is necessary (Blake et al., 2017). However, controlling coccidiosis in poultry is relatively difficult, and the present study aimed to investigate the prevalence of coccidiosis in broiler chicken farms in Mazar-e-sharif Afghanistan.

2. Material and method

2.1. Study area

The study was conducted in Mazar-e-Sharif city (36°, 42´, 33´´ N latitudes and 67°, 6´, 47´´ E longitudes that is 357m [1171ft] above sea level) located in north area of Afghanistan (Fig 1).

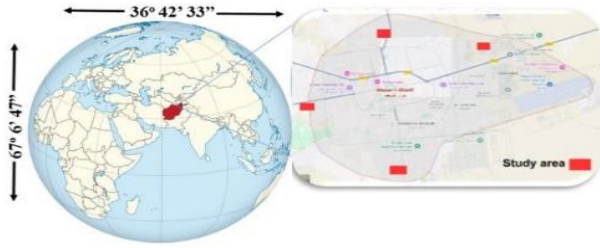

Figure 1: Map of Mazar-e-sharif, Balkh province, northern Afghanistan (Adapted from Haidary and Radzi 2024)

Sample size

From March to December 2017, 170 fecal samples were collected in four stages from 18 poultry farms in Mazar-e-Sharif (From Ali Abad, Dasht Shur, Baba Yadgar and Shadian). Both qualitative and quantitative fecal exams were performed as part of a cross-sectional investigation. Each chicken's feces were taken straight from the rectum, placed in plastic bottles, and taken to the parasitology laboratory for analysis. Age and sex were noted during the sampling process. Each chicken fecal sample's oocysts were identified using the flotation technique with a saturated sodium chloride solution. The McMaster counting approach was used to count the oocysts, and was expressed as per gram of faeces (MAFF, 1982; Conway and McKenzie, 2007).

3. Result

118 (16.4%) of the 720 chickens that were inspected tested positive for coccidian oocysts (Figure 2). The frequencies of infection in male and female hens were 19% and 13.7%, respectively and prevalence rates of 17.8% and 12.2% were noted in chickens classified as young (ages 2–8 weeks) and adult (ages >8 weeks), respectively (Table 1). Furthermore, the season played a significant role in the disease's propagation, with winter and fall seeing the highest infection rates (Table 2).

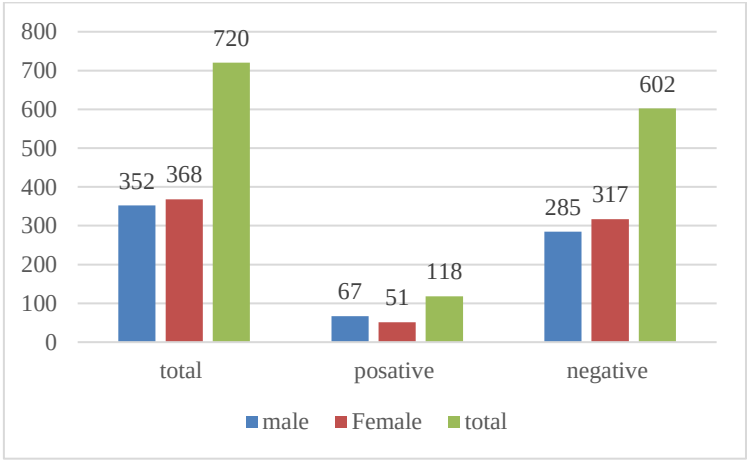

Figure 2: Infection rate by gender

Table 1: Prevalence of coccidiosis in poultry farms in Mazar-e-Sharif by sex and age

Parameters	Positive (%)	Negative (%)	Total
Male	67(19)	285(81)	352
Female	51(13.86)	317(86.1)	368
Total	118(16.4)	602(83.6)	720
Yang (ages 2-8 weeks)	96(17.8)	444(82.2)	540
Adult (ages >8weeks)	22(12.2)	158(87.8)	180
Total	118(16.4)	602(83.6)	720

Table 2: Prevalence of coccidiosis in poultry farms in Mazar-e-Sharif by

	Seasons			
	Spring (%)	Summer (%)	Fall (%)	Winter (%)
Male	10(14.9)	6(9)	23(34.3)	28(41.8)
Female	9(17.6)	7(13.7)	15(29.4)	20(39.2)
Total	19(16.6)	13(11)	38(32.2)	48(40.7)

Seasons

4. Discussion

Coccidiosis prevalence was found to be 16.4%, which is low when compared to studies conducted in previous studies. The number of oocysts in positive samples ranged from 100 to 1,700. In previous studies, the infection rate was reported to be 92% in Romania (Györke et al., 2013), 31.7% and 39.6% in India (Sharma et al., 2013; Jadhav and Nikam, 2014), 20.6% and 70.9% in Ethiopia (Gari et al., 2008; Oljira et al., 2012), 52.9% in Nigeria (Muazu et al., 2008), 71.9% in Pakistan (Khan et al., 2006), 78% in Jordan (Al-Natour et al., 2002), 88.4% in Argentina (McDougald et al., 1997), and 54.3% in Turkey (Karaer et al., 2012). However, other investigations found a lower prevalence. The Sangary et al. study found that the prevalence of coccidiosis in Kabul broiler chickens was 8% (Sangary et al., 2024) also prevalence of coccidiosis in Brazilian was 5.5% (Gazoni et al., 2020).

Because of the full life cycle and the rise in oocyst consumption, it appears that there is a direct correlation between age and the prevalence rate of coccidiosis. According to Muazu et al., chickens of all ages are prone to illness, but usually resolves itself around 6–8 weeks of age (Muazu

et al., 2008). One of the main contributing factors to coccidiosis is age. Our study found that the age groups of 5-7 weeks had a greater rate of coccidiosis. This substantial link was consistent with findings from other researchers (Razmi and Kalideri, 2000; Muazu et al., 2008; Shirzad et al., 2011; Oljira et al., 2012).

This suggests that environmental conditions, such as humidity and temperature, play a significant role in the lifecycle of the coccidia parasites. In this study, the prevalence was higher in the wet season, as in a study in India; infection was reported to be 32% in the rainy season and 19.3% in the summer season (Khursheed et al., 2022).

5. Conclusions

Coccidiosis is a major parasitic disease affecting poultry, particularly chickens, and is characterized by intestinal damage that leads to significant mortality and substantial economic losses in poultry farms. The disease has a worldwide distribution and represents a potential threat to the poultry industry in Afghanistan, where it could compromise productivity and farm sustainability. Based on the findings of the present study, the prevalence of this disease in poultry farms in Mazar-e-Sharif is considered relatively low. Therefore, in order to improve farm management, more research is required, and appropriate control measures should be designed.

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