

Correlation Between Body Condition Score and Dag Score with the Level of Gastrointestinal Parasite Infestation in Local Sheep at Bantul Slaughterhouse

Muhammad Kautsar¹, Irkham Widiyono², Joko Prastowo³, Zein Ahmad Baihaqi⁴

¹Master Program of Veterinary Science, Faculty of Veterinary Medicine, Gadjah Mada University, Yogyakarta, Indonesia

²Department of Internal Medicine, Faculty of Veterinary Medicine, Gadjah Mada University, Yogyakarta, Indonesia

³Department of Parasitology, Faculty of Veterinary Medicine, Gadjah Mada University, Yogyakarta, Indonesia

⁴Research Center for Animal Husbandry, National Research and Innovation Agency (BRIN), West Java, Indonesia

Abstract. Gastrointestinal parasite infestation has been recognized as a serious threat to sheep and goats worldwide. This study aimed to investigate the health status of sheep designated for slaughter at Local Abattoir in Bantul Regency, focusing on the correlation between physical parameters (BCS and Dag Score) and clinical parameters (Blood and fecal examination). A total of 27 sheep were evaluated for BCS and Dag Score, followed by blood sampling for hematological analysis and fecal samples for parasitological examination of eggs and oocysts. BCS was assessed using a 1-5 scale, while Dag Score uses a 1-5 scale to indicate the level of fecal contamination in the perianal area [1], [2]. Fecal samples were processed using a modified McMaster technique to measure the number of parasite eggs/oocysts. The results showed that 77.78% of the sheep positive for gastrointestinal parasite. Nematode eggs were detected more frequently (70.37%) than coccidian oocysts (33.33%), with strongyle-type eggs predominating. Hematological findings indicated eosinophilia and elevated total protein. However, parasite infestation levels were not significantly associated with BCS or Dag Score ($P > 0.05$). Our findings show that BCS and Dag Score alone cannot reliably indicate parasite burden in sheep, so routine fecal monitoring is needed.

1. Introduction

Sheep farming in Indonesia is a vital component of the national livestock sector, contributing to food security, rural livelihoods, and cultural practices. The sector is characterized by smallholder dominance, with sheep raised for meat, manure, and as a source of capital. Demand for sheep products is rising, fueled by population growth,

* Corresponding author: irkhamwidiyono@ugm.ac.id

urbanization, and religious festivals such as Eid al-Adha and Aqiqah, which drive seasonal spikes in consumption and prices [1]. Gastrointestinal (GI) parasite infections are a serious health problem that results in significant losses in welfare, production, and the economy. Research has shown that helminth infections cost Europe alone over €1.8 billion a year, with reduced productivity being the main cause of the losses [2]. Reduced feed intake, sluggish development, anemia, diarrhea, rough hair, and poor body condition score (BCS) are some of the symptoms caused by GI parasites, which include nematodes, cestodes, trematodes, and protozoa. These symptoms can increase herd mortality rates [3].

The prevalence of GI parasites in sheep in Indonesia is notably high, with significant impacts on the health and productivity of the animals. In Wonosobo District, Central Java, the overall prevalence of GI parasite infections in Wonosobo sheep is 66.92%, with *Haemonchus* spp. being the most prevalent parasite [4]. Another study in the same region found that the prevalence of GI worms in Wonosobo and thin-tailed sheep varied with season and altitude, with the highest prevalence observed in male thin-tailed sheep during the rainy season (76.47%) [5]. However, while prevalence data are increasingly available, there remains limited information on how simple, field-applicable indicators such as BCS and dag score relate to the frequency and severity of parasite shedding. Addressing this gap is important because BCS and dag score are low-cost tools that farmers and animal health workers can apply routinely, if these scores reliably reflect parasite burden or shedding risk, they can help identify animals most likely to suffer production losses or contribute disproportionately to pasture contamination, thereby improving the efficiency of parasite surveillance and control [2]. There is a lack of information regarding the relationship between BCS and DAG Scoring with the frequency and severity of gastrointestinal parasites in sheep. Therefore, the main objectives of this study were to determine the prevalence of gastrointestinal parasites, measure the fecal egg/oocyst count, and assess the correlation of these findings with BCS and DAG scores in sheep in Bantul, Yogyakarta.

2. Materials and methods

2.1. Ethical Considerations

This research has been approved by the Research Ethics Committee of the Faculty of Veterinary Medicine, Gadjah Mada University, under document number 118/EC-FKH-int./2025.

2.2 Study Area

This research was conducted at a local abattoir in Bantul Regency, Yogyakarta, Indonesia. The abattoir was selected as an ideal surveillance site for livestock diseases, including parasitic infections, because the sheep slaughtered there are sourced from multiple livestock areas within Bantul Regency and surrounding regions. A total of 27 sheep were included in this study and were selected using purposive sampling with the following criteria: (1) female sheep aged 7-8 months, (2) clinically stable, and (3) no obvious severe systemic illness or traumatic injury. Therefore, this abattoir represents animals from diverse origins and provides a representative sample for observing and assessing the incidence of helminthiasis in the region.

2.3 Body Condition Score

Body condition score assessment method based on study previously [6]. BCS The scoring system is carried out by estimating the amount of fat or physical condition of the animal. This assessment is carried out by feeling the vertical processes (spine) and horizontal processes (short ribs) of the animal . Animals are given a score on a scale of 1 to 5, where a score of 1 indicates a very thin condition, while a score of 5 indicates that the animal is in a condition of being too fat.

2.4 Dag Score

The Dag score assessment method is based on previous research [7]. The scoring is conducted by visually inspecting the area beneath perineal region and the inner hind legs. Each animal is then assigned a score on a 0–5 scale: 0 = clean with no fecal material attached, 1 = minimal staining or a few small pellets, 2 = mild soiling with small patches of feces, 3 = moderate soiling with obvious fecal clumps covering part of the area, 4 = heavy soiling with large clumps extending across most of the perineum and hindquarters, and 5 = extreme soiling with extensive fecal coverage and thick dags..

2.5 Faeces and Blood Examination

The McMaster examination method was used for fecal samples [4]. Fecal samples were examined by homogenizing the feces in a flotation solution, filtering the suspension, and loading it into a McMaster counting chamber. Eggs and oocysts within the grid were then counted under a microscope. The severity of EPG excretion was categorized as <5 EpG (below the limit of detection), 5 to 500 EpG (low), 501 to 1000 EpG (moderate), or >1000 EpG (high). The severity of OPG excretion was categorized as 0 OPG (no infection), ≤ 1800 OPG (low), 1800–6000 OPG (moderate), and ≥6000 OPG (high). Blood samples were taken as much as 2-3 ml and then placed into a vacutainer containing ethylenediaminetetraacetic acid (EDTA). Blood samples were then subjected to hematological examination with parameters such as hemoglobin (Hb), packed cell volume (PCV), total leukocytes, total erythrocytes, lymphocytes, monocytes, eosinophils, basophils, and neutrophils.

2.6 Statistical Analysis

Data obtained during field collection and laboratory analysis were summarized using Microsoft Excel 2007. Statistical analyses were performed using SPSS version 27.0. Data normality was assessed using the Shapiro–Wilk test. The association between fecal egg counts (EPG) and clinical parameters (BCS, Dag score, and hematological parameters) was evaluated using Spearman's rank correlation.

3. Results and Discussion

In this study, we evaluated 27 sheep presented for slaughter and first assessed their overall condition using simple field indicators. The animals generally appeared well maintained. The mean Body Condition Score (BCS) was 3, which reflects an ideal nutritional status, while the mean Dag Score was 0, indicating minimal fecal contamination around the rump and perineal region. These findings suggest that, based on external appearance alone, most sheep were in good physical condition and hygienic. However, gastrointestinal parasite

infestation can still impair livestock performance, even when outward signs are limited. Therefore, documenting BCS and Dag Score in this population provides an important baseline to evaluate whether these practical indicators align with laboratory measures of infection.

Table 1 reveals the findings of the fecal examination. The majority of animals, specifically 21 animals (77.78%), tested positive for parasitic infections in the digestive tract, according to the findings of examinations for parasitic infections conducted on 27 animals. Although the average test results indicated that the coccidia infection (OPG) was 408.89 ± 1082.89 and the worm infection level (EPG) was 304.4 ± 612.1 , these data generally indicate that the average animal experienced infestation in the low category (below 500 EPG or 1800 OPG). However, there was a very large variation between individuals (high standard deviation values), suggesting that some animals may carry a much higher infection burden. These findings are consistent with epidemiological patterns in small ruminants in tropical and subtropical regions, where parasitic infection pressure is often endemic and strongly influenced by climate and husbandry practices [3]. The measured parasite burden does not show an acute surge, despite the fact that the majority of animals may act as carriers, according to the low mean EPG and OPG values. However, since the correlation between EPG and actual worm burden is not always reliable, interpretation should be done with caution. Fecal egg counts (FEC) are more accurately considered as markers of pasture contamination and as useful instruments for tracking and directing control measures.

Morphological identification of the detected eggs indicated a predominance of strongylid type nematode eggs, which is generally insufficient to confirm species level identification without further examinations. Even so, in sheep, the nematode group that is frequently dominant and clinically important is *Haemonchus* spp. Infection with *Haemonchus contortus* warrants particular attention because it is hematophagous and can cause anemia, reduced body condition, and production losses, especially under conducive environmental conditions [10]. In addition, the concurrent detection of coccidia alongside nematodes indicates a mixed-infection pattern that commonly occurs in field-based production systems and may not always be accompanied by obvious clinical signs at the time of sampling.

Table 1. Prevalence and degree of gastrointestinal parasitic infections

Number of Animals	Number of Infected	Mean \pm SD	
	Animals (%)	EPG	OPG
27	21 (77.78%)	304.4 ± 612.1	408.89 ± 1082.89

The severity of helminthiasis infestation cases is shown in Table 2. The majority of animals examined were in the low worm infection category, with 17 (63.0%) showing low severity. Furthermore, nearly a third of the population, namely 8 animals (29.6%), were even below the detection limit, indicating a relatively safe condition. However, it is important to be aware that the remaining 2 animals (7.4%) experienced significant levels of worm infection, with 1 animal (3.7%) having a moderate level and 1 animal (3.7%) having a high level. The measured parasite burden does not show an acute surge, despite the fact that the majority of animals may act as carriers, according to the low mean EPG and OPG values. However, since the correlation between EPG and actual worm burden is not always reliable, interpretation should be done with caution. Fecal egg counts (FEC) are more accurately considered as markers of pasture contamination and as useful instruments for tracking and directing control measures.

The severity of coccidia infestation is shown in Table 3. Based on Table 3 regarding the Severity of Coccidia Infestation, the majority of the study subjects were in the No Infection category, which reached 66.7% (18 individuals). The remaining 33.3% of the total showed varying degrees of infestation severity. Low infestation was the most common among those infected, at 22.2%. However, only a small percentage of subjects had moderate or high infestations (7.4% and 3.7%, respectively), suggesting that severe coccidia infestation is not common in the population under study. Although clinically significant outbreaks can still happen when management or weather changes increase exposure, this pattern might suggest that environmental pressure and major stressors were not significantly amplifying coccidial cycling at the time of sampling. Mixed infections are common in small ruminants, even though severe coccidiosis is uncommon. These infections can have additive or synergistic effects on gut function and nutrient utilization, which can reduce productivity [8].

The results of the blood test analysis are shown in Table 4. Eosinophils and total protein increased significantly. These changes represent an immune response to parasite infestation. The hematological data indicate a relatively stable population-level blood profile, with hematocrit, hemoglobin, and red blood cell count falling within the reference range and tending toward the upper end; therefore, these values do not suggest anemia at the population level. This pattern is consistent with the coprological findings, which were dominated by low infection intensity and a substantial proportion of animals below the detection limit, because anemia caused by hematophagous strongylids particularly *Haemonchus contortus* typically becomes evident when infection is heavier and sustained [9]. However, gastrointestinal nematode infections commonly exhibit overdispersion, whereby a small subset of hosts carries and sheds far more eggs than the majority, as a result, mean hematological values can mask susceptible individuals who are at higher risk of hematological decline and who may contribute disproportionately to pasture contamination. The coccidia severity profile dominated by uninfected animals with most positives falling into the mild category suggests that environmental challenge and stressors were relatively controlled at the time of sampling. Nevertheless, experimental evidence indicates that pathogenic *Eimeria* infections can still impair performance and compromise intestinal health even when severe cases are uncommon, meaning that mild or subclinical infections remain relevant to productivity [6].

Table 2. Severity of helminthiasis infestation

Severity Level	Frequency	Percentage (%)
Below the limit	8	29.6
Low	17	63.0
Currently	1	3.7
Tall	1	3.7
Total	27	100

Table 3. Severity of coccidia infestation

Severity Level	Frequency	Percentage (%)
No Infection	18	66.7
Low	6	22.2
Currently	2	7.4
Tall	1	3.7
Total	27	100

The results of the correlation analysis of egg/oocyst excretion against BCS, Dag score, and blood parameters are shown in Table 5. The results show no significant correlation

between EPG/OPG excretion with BCS, Dag score, and blood parameters. This is because the level of parasite severity is still low so it has not caused enough physiological changes to cause a significant correlation. In sick animals, 85% of the performance of weight gain is still shown. Thin animals should also be examined further to determine the underlying cause [7].

Table 4. Mean value of hematology parameters in sheep

Blood Parameters	Mean	SD	Reference [18]
Hct (%)	42.15	7.6	27-45
Hb (gr%)	14.92	2.15	9-15
RBC (million /mm ³)	11.07	1.88	9-15
WBC (cells / mm ³)	9375.92	3057.41	4,000-12,000
TP (g%)	12.55	17.0	6-7.5
Fibrinogen (mg%)	429.62	148.88	100-500
Neutrophils (cells /mm3)	5537.09	2336.68	700-6,000
Eosinophil (cells /mm3)	1435.61	1125.68	0-1000
Lymphocytes (cells /mm3)	2112.31	943.46	2000-9000
Monocytes (cells /mm3)	368.31	271.31	0-750

High EPG/OPG excretion does not necessarily cause significant diarrhea symptoms. There was no correlation ($p > 0.05$) between EPG/OPG excretion and total protein and eosinophils. In this study, total protein was not directly affected by EPG/OPG excretion and further examination is necessary. Meanwhile, the eosinophil parameter did not correlate because total leukocytes were still within the normal range and therefore not sufficient to cause significant changes. Previous studies revealed a slight correlation between BCS and gastrointestinal infection, but the DAG score parameter did not correlate [7]. This pattern directly supports Targeted Selective Treatment (TST) rather than blanket treatment based on diarrhoea or single-time-point hematology, TST prioritizes treating the minority most likely to be clinically affected and contaminate pasture, which has been shown to reduce anthelmintic use substantially while maintaining similar herd-health gains when correctly targeted.

Table 5. Correlation of EPG/OPG with BCS, Dag score, and blood parameters

Gastrointestinal parasite infestation	Parameter	R	95%CI		p Value
			Lower	Upper	
EPG	BCS	-0.351	-0.652	0.046	0.073
	Dag Score	-0.026	-0.412	0.368	0.899
	Hct (%)	0.219	-0.181	0.556	0.273
	Hb (gr%)	0.148	-0.248	0.502	0.460
	RBC (million /mm ³)	0.034	-0.351	0.409	0.868
	WBC (cells /mm ³)	0.052	-0.335	0.424	0.798
	TP (g%)	0.217	-0.182	0.555	0.276
	Fibrinogen (mg%)	-0.063	-0.433	0.325	0.753
	Neutrophils (cells /mm ³)	-0.201	-0.198	0.542	0.315
	Eosinophil (cells /mm ³)	-0.062	-0.432	0.326	0.758
	Lymphocytes (cells /mm ³)	-0.280	-0.602	0.119	0.157
	Monocytes (cells /mm ³)	0.151	-0.245	0.504	0.453
	OPG	BCS	0.301	-0.544	0.211
Dag Score		0.277	-0.499	0.269	0.502
Hct (%)		0.272	-0.098	0.617	0.127
Hb (gr%)		0.028	-0.123	0.599	0.162
RBC (million /mm ³)		-0.117	-0.127	0.596	0.17
WBC (cells/ mm ³)		-0.056	-0.356	0.404	0.89
TP (g%)		-0.070	-0.477	0.276	0.56
Fibrinogen (mg%)		-0.050	-0.427	0.331	0.781
Neutrophils (cells /mm ³)		0.028	-0.438	0.319	0.73
Eosinophil (cells /mm ³)		-0.017	-0.422	0.336	0.803
Lymphocytes (cells /mm ³)		0.301	-0.356	0.404	0.89
Monocytes (cells /mm ³)		0.277	-0.395	0.365	0.932

4. Conclusion

This study found that gastrointestinal parasite infestation is common in local sheep at the Bantul slaughterhouse, with a prevalence rate of 77.78%. Most infections were mild, and the majority of animals showed low egg and oocyst counts. Blood tests indicated mild immune responses, such as increased eosinophils and total protein levels. There was no significant correlation between parasite levels and body condition score, dag score, or hematological parameters. These results indicate that low-level infestations may not significantly impact the physical or clinical conditions of the sheep. Continuous monitoring and preventive parasite control remain essential to protect animal health and productivity.

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