

INCIDENCE OF BROILER CAECAL COCCIDIOSIS IN NINEVAH GOVERNORATE 1999-2004

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(Received: October 3, 2006; Accepted: January 23, 2007)

ABSTRACT

A descriptive epidemiological survey was made in Nineveh governorate 1999-2004 for determination of broiler clinical caecal coccidiosis incidence in broiler chickens. Out of total 3594 broiler patches reared in this period, 1918 (53.36%) were positive to caecal coccidiosis. The highest percentages (35.34%) of coccidial cases were recorded in the year 2000. There was a decreasing tendency in recording caecal coccidiosis from 24.29% in 1999 to 6.77% in 2004. There was a positive relationship between the patch size (number of birds) in each year and the incidence of caecal coccidiosis. Of the main 7 NINEVAH governmental localities, Kara kosh, practiced the highest incidence of caecal coccidiosis through 1999-2004, in which 1615(49.21%) broiler patches were reared out of the total 3594 broiler patches reared in all 7 localities. Seasonal effect on the incidence of caecal coccidiosis show that the highest were reported in Spring then Autumn, followed by Winter and Summer months. Most of the broiler patches experienced caecal coccidiosis between 3-6 weeks of age. From 1918 positive broiler patches to coccidiosis, 1344 patches were fed diets without anticoccidials, while 574 positive broiler patches were fed diets with anticoccidials. There was a decreasing tendency in caecal coccidiosis with increasing number of broiler patches fed diets amended with anticoccidials from 1999 till 2004. The hygienic significance in reducing clinical caecal coccidiosis was discussed.

نسب حدوث كوكسيديا الأورين لأفراخ فروج اللحم في محافظة نينوى 1999-2004

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موصل – العراق

الخلاصة

تم اجراء دراسة مسحية وصفية في مختلف مناطق محافظة نينوى خلال الفترة 1999-2004 لتحديد نسبة حدوث حالات كوكسيديا الاورين السريري في افراخ فروج اللحم فمن بين 3594 وجبة فروج لحم تم تربيتها كان هناك 1918 وجبة موجبة للاصابة وبنسبة (5336%) النسبة الاعلى من حالات الاصابة خلال السنين الستة المشمولة بالدراسة سجلت في عام 2000 وبلغت (3534%) كان هناك ميل للتناقص في

نسبة الاصابة منذ العام 1999 وحتى العام 2004 حيث انخفضت من 2429% الى 677% كماو كان هناك علاقة ايجابية بين حجم الوجبة (اعداد فروج اللحم المرباة) في كل عام ونسبة الاصابة من بين المناطق الاكثر تربية لفروج اللحم زاولت منطقة قره قوش النسبة الاعلى للاصابة حيث بلغت اعداد الوجبات المصابة 1615 وبنسبة (4921%) من بين مجموع الوجبات الكلي. التأثير الموسمي على نسبة الاصابة كان واضحا في ارتفاعه في فصلي الربيع والخريف عن باقي فصول السنة اغلب وجبات فروج اللحم جابهت الاصابة في الاسبوع 3-6 من العمر وبلغت اعداد الوجبات الموجبة للاصابة والتي لم تستهلك مضادات الكوكسيديا 1344 بينما بلغت تلك التي استهلكت المضادات 574 وجبة الا انه كان هناك ميل للتناقص في نسبة الاصابة مع مرورسني دراسه مع كل زيادة في نسبة استهلاك مضادات الكوكسيديا نوقشت الاهمية الصحية لكوكسيديا الاعورين السريري في افراح فروج اللحم.

INTRODUCTION

The poultry industry in Iraq has recorded considerable expansion in recent years. This has led to the establishment of poultry farms around major cities in the state. Poultry diseases remain one of the major threats to boosting poultry production in Iraq. Parasitic diseases are of particular importance because of their high incidence in poultry occasioned by the tropical environmental conditions (1). Epidemiological studies have established the economic importance of coccidiosis as a major parasitic disease (2, 3). Coccidiosis is a self-limiting, infectious disease of the digestive tract caused by hosts pacific intracellular protozoal parasites of the genus *Eimeria* (4). Coccidia are classified under the subkingdom Protozoa of the phylum Apicomplexia (5, 6). As a group, coccidia of the genus *Eimeria* cause the most widespread health problems in the broiler industry and remain one of the most expensive diseases of commercial poultry production (7, 8). Birds infected with coccidial oocysts do not perform as well as non-infected birds because of moderate to severe damage to the intestinal mucosa, decreased weight gains, increased feed conversion, (9, 10). According to Edgar (1992) (7), it takes only one viable oocyst to establish the presence of coccidia in a poultry house. The prevalence of coccidiosis is worldwide and can be found in almost every commercial poultry flock (4, 11). In poultry, there are seven species of *Eimeria* that infect chickens (4, 12). All of the chicken coccidia are pathogenic; however, some species produce more severe effects than others do, such as severe morbidity and mortality. Coccidiosis caused by *E. tenella* is the best known of the avian types, partly because of the spectacular disease it causes, and partly because of its widespread importance in commercial broilers (4). These microscopic, one-celled parasites invade their host via the fecal-oral route, and immunity is achieved once the parasite completes its life cycle in the host (4). Chickens of all ages are susceptible to coccidiosis, but birds that are three to five weeks of age are the most vulnerable (3, 7). The *Eimeria* species have an extremely complex life cycle comprising stages both Internal and external to the host. Infection occurs by ingesting sporulated coccidial oocysts found in contaminated litter, soil, feed or water. After ingestion, the protozoa go through a series of intracellular, extra cellular, asexual, and sexual stages to produce viable oocysts that are excreted in the feces. After a brief period outside of the host, the oocysts become infective again through the process of sporulation, and the life cycle is complete (13). The

impacts of coccidiosis are significant; however, eradication is impractical due to protective mechanisms of the oocysts. *Eimeria* possess a thick outer wall that acts as protective barrier, which enhances the chance of survival under severe conditions. The oocysts are able to remain infective outside of the host for long periods, and their protective properties allow them to be resistant to many harsh chemicals and disinfectants (5, 7, 14). For many years it had been recognized that rearing large numbers of young chicks in close association involved a risk of coccidiosis. Initial attention was concentrated upon acute coccidiosis caused by *Eimeria tenella* which was mainly seen during the intensive rearing of large numbers of newly hatched chicks. It was also the species about which most was known and the disease could be readily identified by the characteristic hemorrhagic caeca and bloody droppings. It was essentially the major coccidiosis problem of meat production birds. The production of meat-type poultry in NINEVAH governorate has greatly struggling for expansion over the past several years. More specialized diets were used; superior birds were selected for enhancing growth, reproductive rates, and many vaccines were practiced in an attempt to improved immune system of the bird. Improving bird livability has faced the presence of some poultry endemic diseases that still hit all-over poultry production, preventing the industry to thrive and succeed. Of these, coccidiosis in Nineveh commercial poultry industry has still increased due to lack of biosecurity policy, higher stocking densities which favored the spread of this disease in commercial poultry facilities.

This study therefore aims at assessing the prevalence of acute broiler caecal coccidiosis problem caused by the most pathogenic species *Eimeria tenella* in Nineveh governorate through the period 1999-2004.

MATERIALS AND METHODS

Study area: Nineveh governorate is made up of eleven local government areas namely; Akra, Aen sifny , Kara kosh, Bahshika, Tall kyef, Al-mosul, AL-shirkat, Al-hathar, Tall-abta, Tall afar, Singar. The most important villages in these governmental localities which practiced broiler production are; Kokjaly, Bazwaya, Shalalat, Khorcebat, Eshkaftan, Kolan-tapa, Bahsika, Bahzany, Baweza, Barema, Korkareban, Fathleia, Akrawa, Baebokh, Shorkan, Nawaran, Dernag, Bashiba, Basakhra, Tall-kyef, Rashidia, Hlela, Bazedo, Kuba, Al-geren, Hamam Al-alel, Al-mowaly, Gamalia, Al-namrod, Al-khan Al-ganoby, Kiara, Kara kosh, Tal-yosif, Shikh mohamad, Aen talawee, Shorkan, Karyat zakaria, Bartilla, Kabarly, Bazkertan, Shik amer, Kharab sultan, Khazna, Kanhash, Al humera, Ali rash, Karamlis, Balawat, Hmedat, Tobzawa, Makhmor, Kara kokenly, Daraweesh, Tall afar, Eiathia, Abo garboaa, Seto, Sonono, Kirshik, Khansor, Sigar. There are four distinct seasons characterized by cold Winter months (Dec, Jan, Feb), rainy Spring months (Mar, Apr, May), dry Summer months (Jun, Jul, Aug), and humid Autumn months (Sep , Oct, Nov).

Data collection: The study-involved scrutiny of farm and clinical records obtained from private and government veterinarians and agricultural extension officers to elicit relevant data on farm activities in Nineveh governorate in those areas of intensively rearing broilers and were; Kara kosh, Bahshika, Tall kyef, Al-Mosul, AL-shirkat, , Tall afar, Singar, over the years 1999-2004. Clinical records in the study area are generated through the diagnostic activities of either state and private veterinarians, agricultural extension officers or the farmers themselves.

Diagnosis of clinical caecal coccidiosis usually involves clinical examination of the flock and individual cases, post mortem and parasitological examination of feces and intestinal scrapings. The farmers on the other hand usually base diagnosis of coccidiosis on the combined factors of citing bloody diarrhea from the birds and witnessing a positive response of such diarrheic birds to coccidiosis treatment. Only acute caecal coccidiosis cases presenting clear bloody diarrhea are involved. Information generated included, farm location, flock size, date of visit, poultry species (e.g. broiler), age, clinical diagnosis, husbandry details, housing and treatment records, representing an excess of 90 per cent of domestic broiler patches produced in the governorate. Most of these institutions were supervised by poultry disease specialists, microbiologists and parasitologists.

Data Analysis: Data generated were analyzed using descriptive statistics with emphasis on absolute distribution and percentage. The prevalence of caecal coccidiosis among the different farm sizes, typology, age, and season were calculated.

RESULTS

Pathological finding: Diagnosis of field clinical caecal coccidiosis was dependent upon cecal lesion findings, which were characterized by prominent fresh blood filling two caeci, with firm bloody cores in many instances, accompanying by clusters of large schizonts and oocysts. Other signs in addition to bleeding were high morbidity and mortality, lost weight gain, emaciation, loss of skin pigmentation. However, the combinations of oocyst size, location and appearance of the lesion in the gut, gave considerable confidence of diagnosis (Figure 1).



Figure1: Clinical caecal coccidiosis in broilers 5 weeks of age with blotchy hemorrhagic lesions, accompanied by hemorrhages into the caecal lumen caused by *Eimeria tenella*

Total incidence of clinical caecal coccidiosis in Nineveh governorate 1999-2004: Out of 3594 broiler patches reared in main seven counties in Nineveh governorate during 1999-2004, there were 1918 broiler patches positive to caecal coccidiosis (53.36%) (Figure2).

Relationship between yearly total and positive number of broiler patches and incidence of clinical caecal coccidiosis 1999-2004: The total and positive numbers of broiler patches and the percentages of positive patches reared in Nineveh governorate during 1999-2004 are illustrated in figure3.

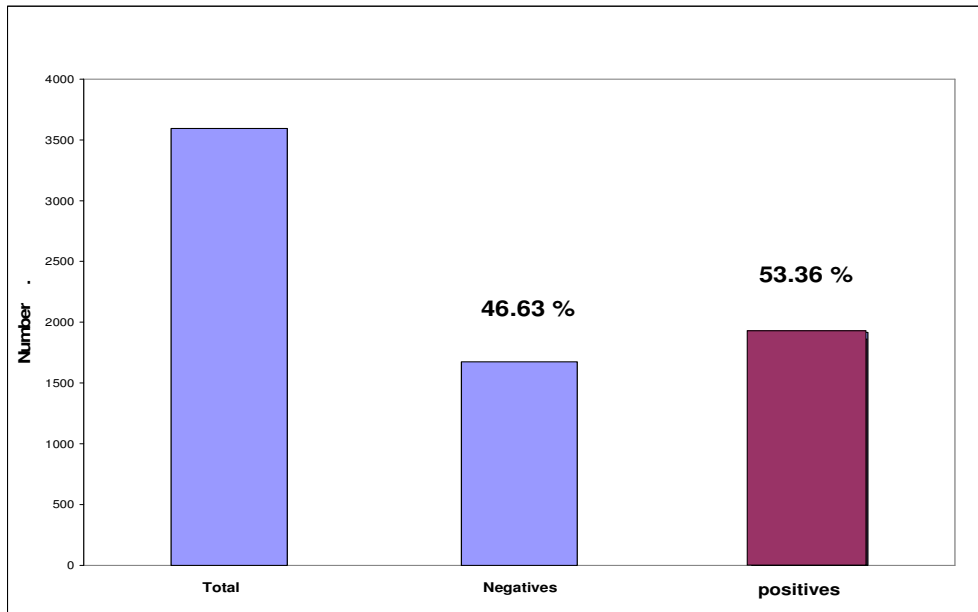


Figure 2: Total number of broiler patches, total number of positives and negatives patches to clinical caecal coccidiosis reared in Nineveh governorate 1999-2004.

The highest number (678) and percentage (35.34%) were noticed in year 2000, followed by (466) patches with 24.29% in 1999. In the third order were the broiler patches in 2001 and were (294) with percentage of 15.23%. In 2002 (209) patches were reared with a percentage of (10%). Less than 10% were positives to caecal coccidiosis in 2003 and 2004 (7.53% and 6.77%) when 141 and 130 broiler patches were reared respectively. There was a linear regression in clinical caecal coccidiosis from 1999 to 2004 (Figure4).

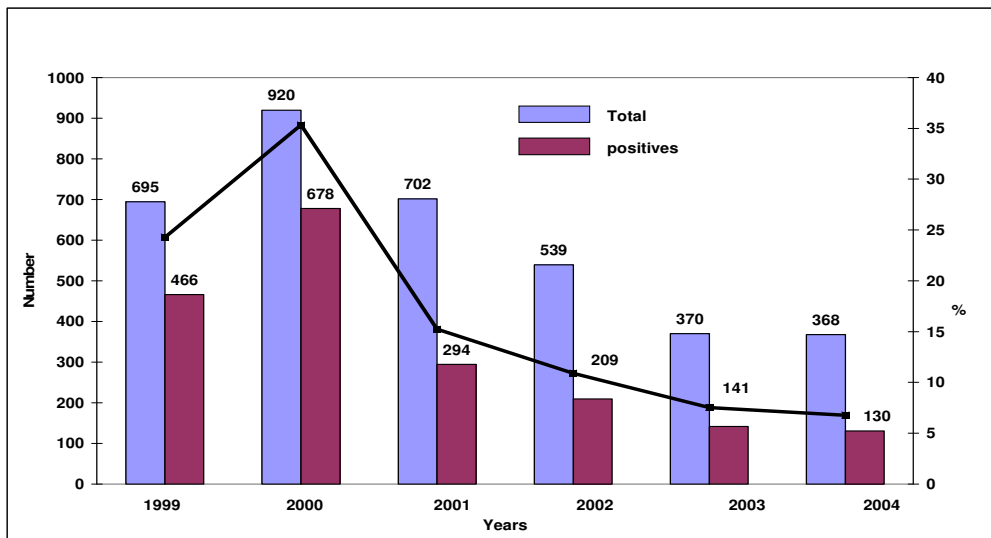


Figure3: Total, positive broiler patches and percentage of positives to clinical caecal coccidiosis in Nineveh governorate 1999-2004

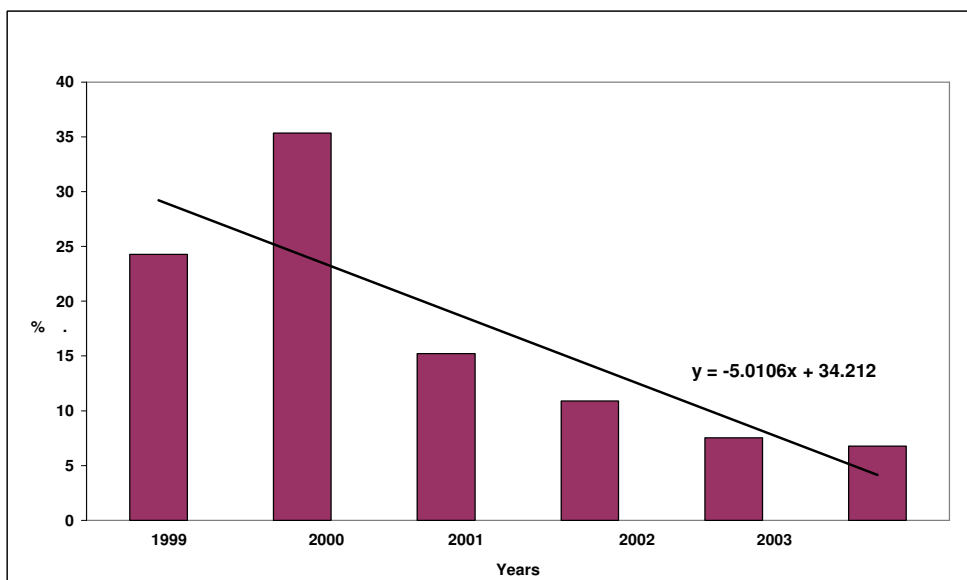


Figure 4: Linear equation of yearly percentage of positive broiler patches to clinical caecal coccidiosis in Nineveh governorate 1999-2004.

Relationship between broiler patch size (number of birds) and incidence of broiler clinical caecal coccidiosis 1999-2004:

There numbers of broilers reared in the year 2000 were (1750000), while they were between 1266000-1322000 through the years 1999, 2001 and 2002. Less than million broilers were harvested in each of the last two years of study 2003 and 2004 and were 703804 and 717119 respectively (Figure5).

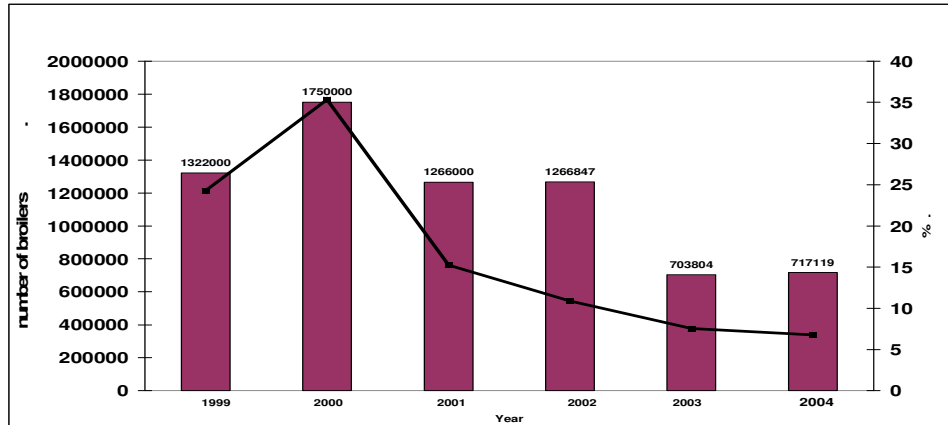


Figure 4: Relationship between broiler patch size and incidence of clinical caecal coccidiosis 1999-2004.

Relationship between the increase in broiler numbers in different patches and clinical caecal coccidiosis occurrence:

The average number of birds of surveyed broiler patches in Nineveh governorate during 1999-2004 were ranged from 5000 to >10000 birds/patch. It was interesting to note that there was linear increase in caecal coccidiosis with each 1000 birds increase in broiler patches. The clinical caecal coccidiosis percentage reached 6.18% in broiler patches with 5000 to 6000 birds/patch. Then it was nearly doubled (11.52%) when patch size increased to 6000-7000 birds, and increased further five percent, i.e., (16.75%) when the number reached 7000-8000 birds/patch. Only 1% increase in the incidence of caecal coccidiosis was noticed with each increase in number of birds from 8000-9000 and from 9000-10000 birds/patch, but it was dramatically increased when the numbers of broilers were over 10000 birds/ patch, and reached 28.60%.

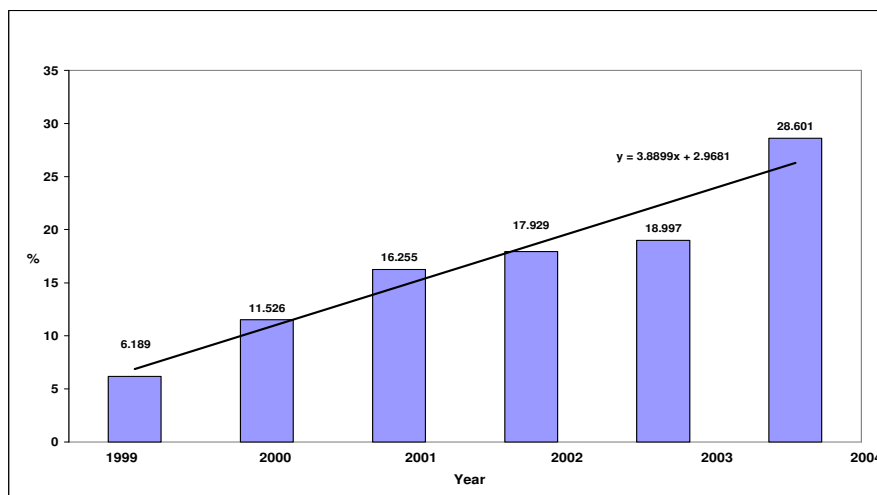


Figure 5: Linear increase in the percentage of clinical caecal coccidiosis with each 1000 birds increase in broilers patch during 1999-2004.

Occurrence of caecal coccidiosis in Nineveh governorate counties:

The total number of broiler patches, positive patches to caecal coccidiosis and their percentages in the seven main NINEVAH governmental localities at each year of survey 1999-2004 are represented in table 1, 6.

About half of all cases of clinical caecal coccidiosis occurred in NINEVAH governorate during 1999-2004 was reported in Kara kosh county (49.21%), followed by percentage reported in Bahshika (29.76%). Tall-kyef county show incidence of 8.43%. Al-shirkat reported 3.93%. At the same level of percentage 3.72% was reported in Tall abta and singar. In Mosul locality 2.91% of clinical caecal coccidiosis was noticed. The least percentage of coccidiosis was found in Tall-afar which was 2.51%.

Table 1: Positive broiler patches (N+), total broiler patches reared (T), and percentage of positivists (%) to clinical caecal coccidiosis in the main 7 Nineveh governmental localities 1999-2004.

County	Year											
	1999		2000		2001		2002		2003		2004	
	N+/T	%	N+/T	%	N+/T	%	N+/T	%	N+/T	%	N+/T	%
Bahshika	139/232	29.82	192/283	28.42	94/290	31.97	67/223	32.05	40/110	28	36/98	25.71
Tall Kyef	25/37	5.36	48/76	7.06	38/70	12.92	28/49	13.39	18/35	12.76	4/25	10
AL-shirkat	20/28	4.29	21/27	3.09	11/33	3.74	8/26	3.82	5/11	3.54	10/12	7.14
Kara kosh	237/323	50.85	398/508	58.61	105/233	35.71	76/184	36.36	58/169	41.13	65/198	46.42
Tall-Afar	10/17	2.14	8/13	1.17	13/36	4.42	10/28	4.78	5/12	3.54	2/6	1.42
Al-Mosul	6/9	1.28	4/5	0.58	18/20	6.12	10/14	4.78	9/17	6.38	9/18	6.42
Singar	29/49	6.22	7/8	1.03	15/20	5.10	10/15	4.78	6/16	4.25	4/11	2.85

Figure; Percentage of positive broiler patches to caecal coccidiosis in 7 main counties of Ninevah governorate 1999-2004

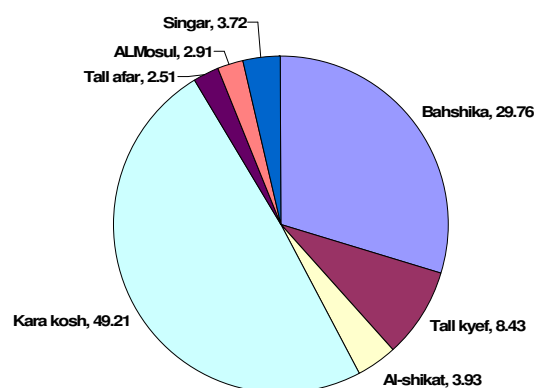


Figure 6: Pie chart representation of positive broiler patches percentage to caecal coccidiosis in the different governmental localities of Nineveh governorate 1999-2004.

Seasonal variation on percentages of clinical caecal coccidiosis in Ninevah governorate: 1999-2004: Seasonal effect on incidence of clinical caecal coccidiosis in NINEVAH governorate through 1999-2004 is shown in table 2,

being high during spring and autumn quarters and low in winter and summer quarters (Figure 7). The average-moving incidence of clinical caecal coccidiosis also reflects high peaks in spring and autumn quarters (Figure 8). There are four distinct seasons characterized by cold Winter months(Dec, Jan, Feb), rainy spring months (Mar, Apr, May), dry Summer months (Jun, Jul, Aug), and humid Autumn months ((Sep , Oct, Nov), (Figure 9).

Table 2: Monthly percentage of clinical caecal coccidiosis in broiler patches in Nineveh governorate 1999-2004.

Year	Month											
	Jan %	Feb %	Mar %	Apr %	May %	Jun %	Jul %	Aug %	Sep %	Oct %	Nov %	Dec %
1999	31	37	49	76	42	33	27	29	40	56	70	53
2000	32	47	76	94	78	49	27	42	47	55	77	52
2001	9	18	44	78	23	10	1	3	16	32	53	14
2002	10	15	28	45	19	12	4	5	10	18	31	13
2003	5	16	23	37	7	1	0	2	4	8	30	6
2004	5	12	25	33	10	5	1	2	6	18	17	9

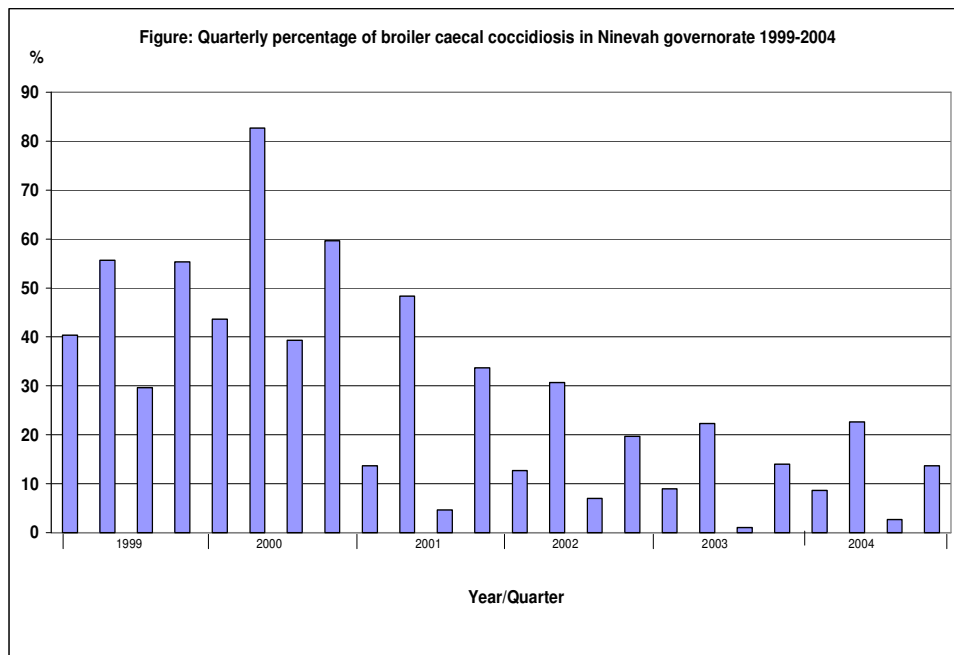


Figure 7: percentage of broiler caecal coccidiosis in Nineveh governorate by year and quarter (1999-2004)

Table 3: Three-months rolling average percentage of broiler caecal coccidiosis in Nineveh governorate 1999-2004

Year	Months											
	Jan %	Feb %	Mar %	Apr %	May %	Jun %	Jul %	Aug %	Sep %	Oct %	Nov %	Dec %
1999		39.0	54.0	55.6	50.3	34.0	29.6	32.0	41.6	55.3	59.6	51.6
2000	44.0	51.6	72.3	82.6	73.6	51.3	39.3	15.6	48.0	59.6	61.3	46.0
2001	26.3	23.6	46.6	48.3	37.0	11.3	4.66	6.66	17.0	33.6	33.0	25.6
2002	13.0	17.6	29.3	30.6	25.3	11.6	7.00	3.33	11.0	19.6	20.6	16.3
2003	11.3	14.6	25.3	22.3	15.0	2.66	1.00	2.00	4.66	14.0	14.6	13.6
2004	7.66	14.0	23.3	22.6	16.0	5.33	2.66	3.00	8.66	13.66	14.66	

Table :Moving average of broiler caecal coccidiosis in Ninevah governorate 1999-2004

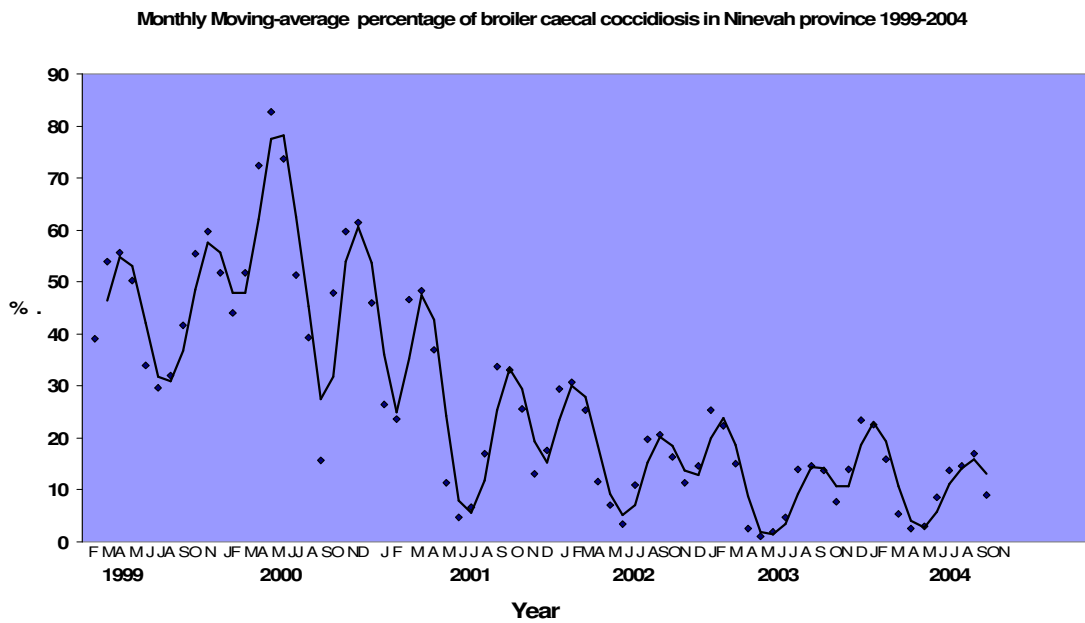


Figure 8: Three-months rolling average percentage of broiler caecal coccidiosis in Ninevah governorate 1999-2004

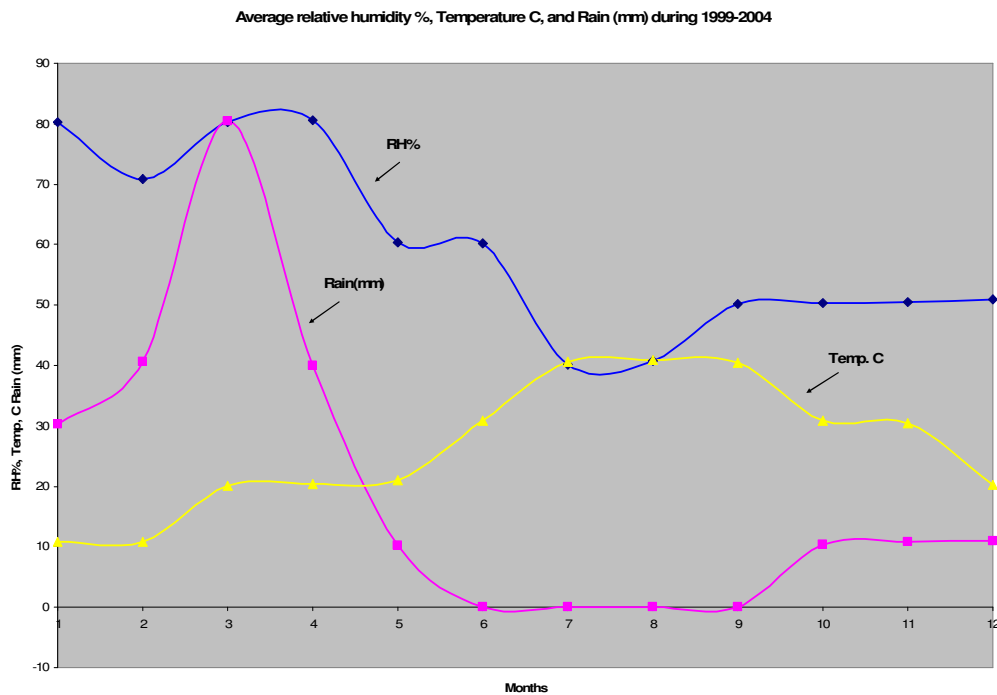


Figure 9: Average relative humidity (%), Temperature Cm and Rain level (mm) in NINEVAH governorate during 1999-2004,

Age of broiler clinical caecal coccidiosis occurrence:

The average age of clinical caecal coccidiosis occurrence in broiler chickens reared in NINEVAH governorate during 1999-2004 was mainly recorded between 3-6 weeks of age, Being highest at 5 weeks of age (38.16%), followed by recording through 4th week (29.40%), and the 6th week (15.06%). Low incidence of caecal coccidiosis was noticed in the third, 7th, and 8th weeks of age, and were (4.95%, 7.09%, and 5.31%) respectively. No cases were recorded in the first two weeks of age (Figure 10). The linear equation of age distribution through the rearing cycle of 8 weeks of broiler chickens is represented in figure 11.

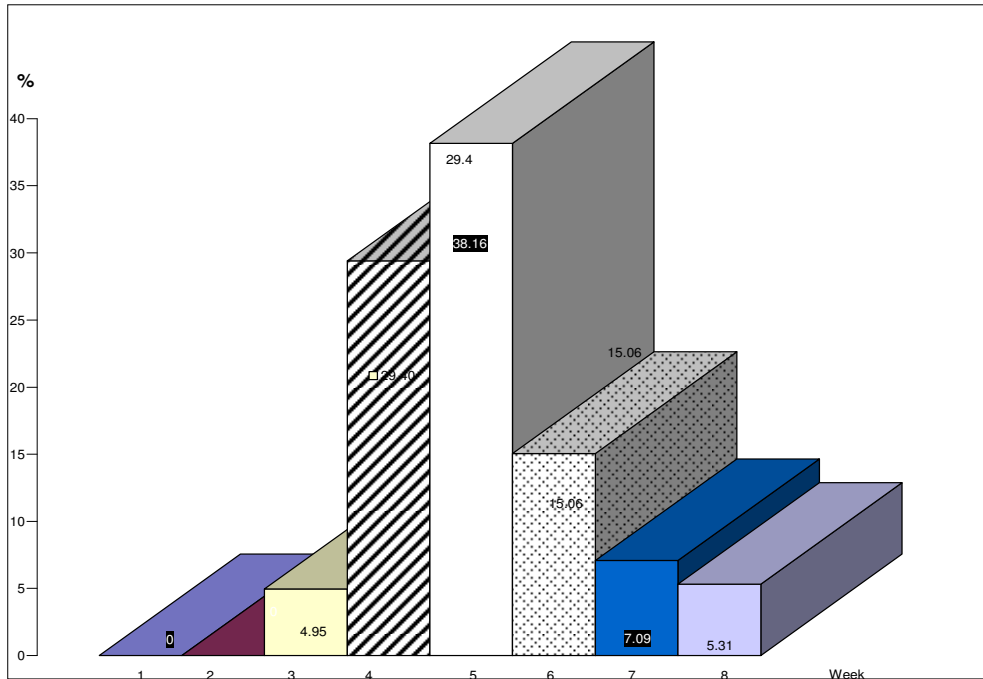


Figure 10: Percentage of age distribution occurrence of clinical caecal coccidiosis in broiler chickens in NINEVAH governorate 1999-2004.

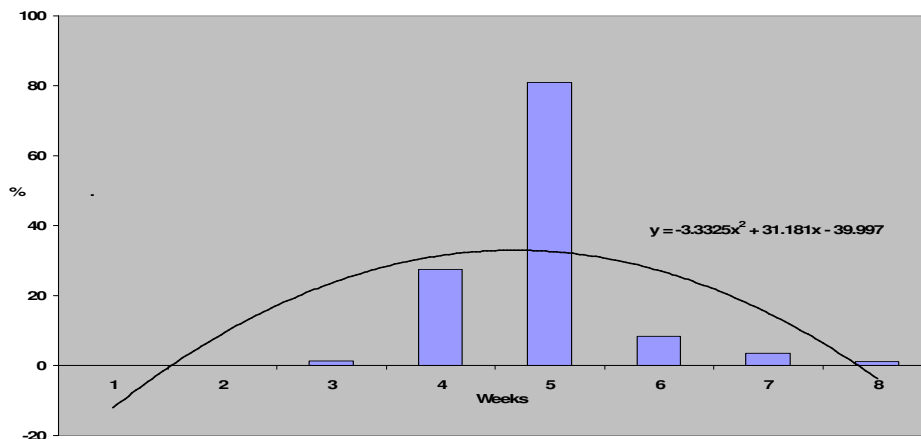


Figure 11: Linear equation of age distribution to clinical caecal coccidiosis occurrence in broiler chickens in NINEVAH governorate 1999-2004

Use of coccidiocidal and clinical caecal coccidiosis occurrence in broiler chickens:

The numbers of broiler patches positive and negative to caecal coccidiosis in Nineva governorate during 1999-2004 are illustrated in diagram 1&figure 12. Higher number of broiler patches (1344) fed diets free from coccidiocidal and so experienced clinical caecal coccidiosis, while only 574 broiler patches although fed diets with coccidiocidal, but still show clinical caecal coccidiosis. In the other side, more negatives (931) broiler patches to clinical caecal coccidiosis when fed diets with coccidiocidal, than those negative broiler patches (745) fed no coccidiocidal.

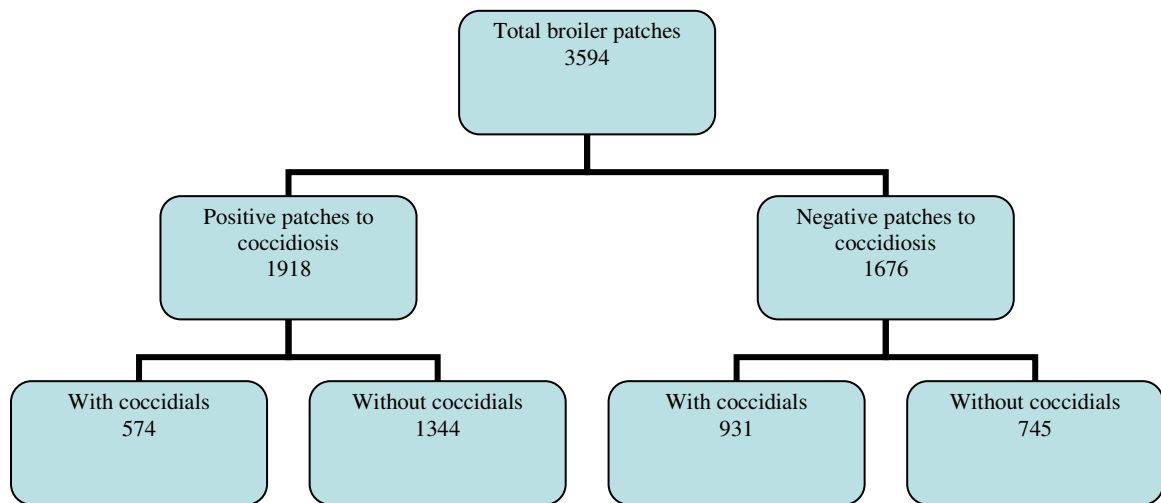


Diagram 1: Number of positive and negative broiler patches to clinical caecal coccidiosis fed diets with or without coccidiocidals in Ninevah governorate 1999-2004.

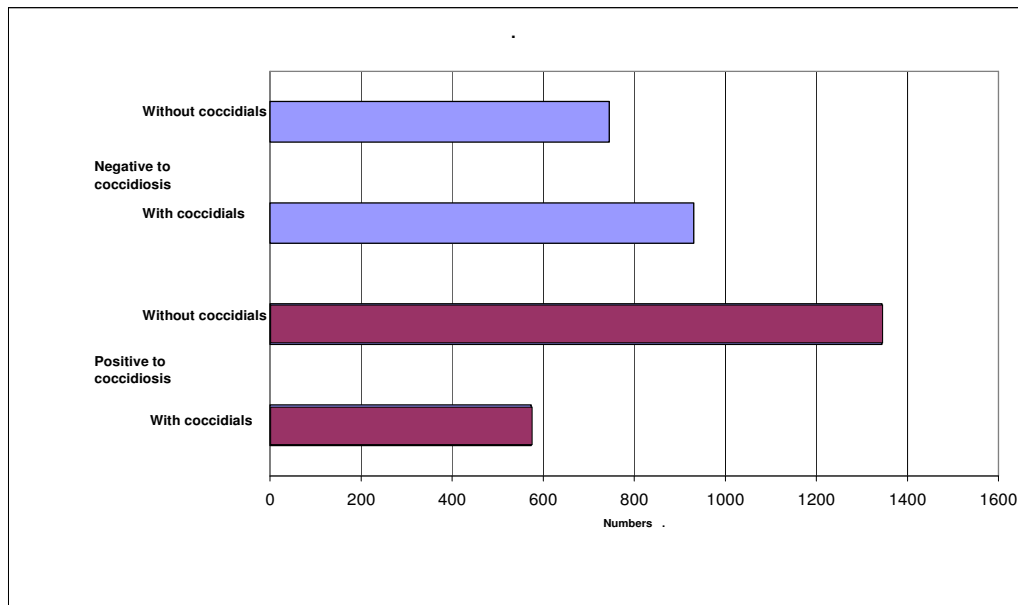


Figure 12: Number of broiler patches experienced clinical caecal coccidiosis when fed diets with or without coccidiocidals in NINEVAH governorate 1999-2004.

The number of broiler patches used feed containing coccidiocidals at low therapeutic levels, like amprolium and sulphanomides, were increased from 95 broiler patches in 1999 up to 376 in 2004. In the same time, there was a reduction in those patched fed diet without coccidiocidals from 400 in 1999 to 97 in 2004

(Figure 14). Illustrating these numbers into percentages is represented in figure 15.

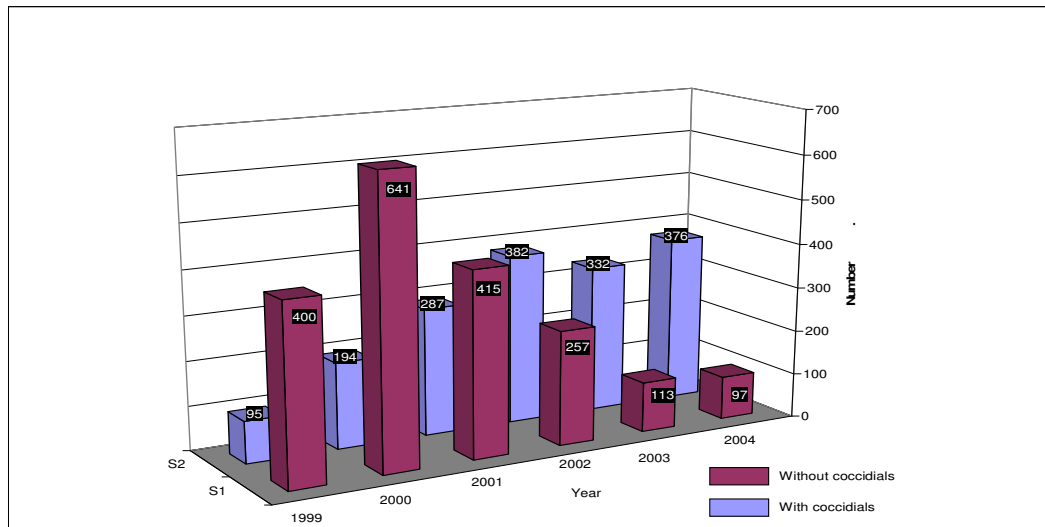


Figure 14: Number of positive and negative broiler patches to caecal coccidiosis fed diets with or without coccidiocidals in NINEVAH governorate 1999-2004.

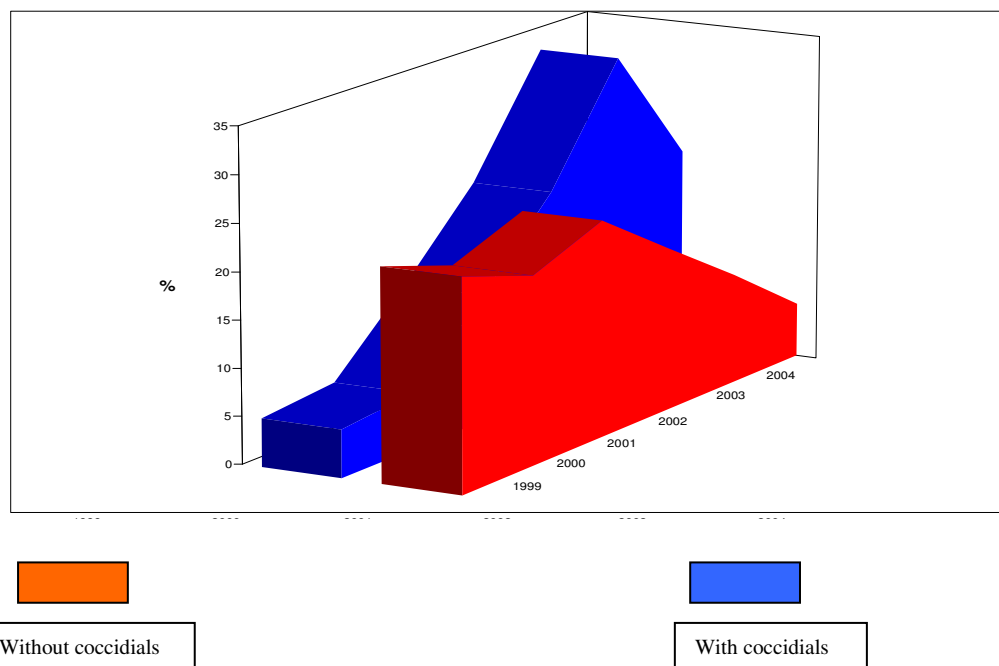


Figure 15: Percentages of positive and negative broiler patches to caecal coccidiosis fed diets with or without coccidiocidals in NINEVAH governorate 1999-2004.

DISCUSSION

In this survey, the diagnosis of endemic clinical caecal coccidiosis was the result of the combination of measurement of oocyst size, location of the lesion in the gut, and appearance of the lesions which characterized by prominent blood

and often firm bloody cores in the affected caeci, all of these gave us considerable confidence in diagnosis. The validity of data in diagnosis is increased when the monitoring was blessing a mixture between data obtained from governmental veterinary institutions (referral veterinary hospitals, veterinary clinics and diagnostic laboratories), and those obtained from private veterinary clinics and laboratories.

The high rate of clinical caecal coccidiosis in NINEVAH governorate during 1999-2004 reflects the deficiency in the application of biosecurity measures in broiler houses and their surroundings. Of these, there was almost entirely absence of physical barriers between broiler houses. The distances between many of them may not exceed 200-300 meters. Chemical treatments of these houses were mostly applied to the inside and not to the surroundings. Owners of these houses, employees, visitors, veterinarians, vaccinators, and others rarely practiced protective clothing. All-in /All-out strategy of broiler production was rarely practiced. The intervals between broiler patches were in many times not exceeding two weeks, without sufficient litter cleaning and disinfection. No effective pest-rodent control. No restriction to visitor access, without placement of signs "No unauthorized entry" in all places. Empty foot dips outside doors was always noticed in most broiler houses, with absence of footwear, washbasins, and hand cleaning facilities in the entry point. Doors open in most times. No controlling for human traffic and no isolation of poultry from contaminated equipments, animals and peoples.

Coccidiosis is a disease of almost universal importance in poultry production. The severity of disease is dependant on both the species of *Eimeria* and the size of the infecting dose of oocysts. It is impossible under farming conditions to produce a coccidian – free environment. Oocysts will remain in buildings from previous crops of birds and will also be carried in by legs of vertebrate and invertebrate agencies. From what-ever source, chicks introduced to buildings quickly become infected (4). However, if the balance between the host and parasite is disturbed by factors which favor the parasite, such as an initial high degree of environmental contamination and/or ideal sporulation conditions, pathogenic numbers of infective oocysts will be ingested by non-immune birds and disease will result (5,15). Emphases of confinement rearing and high-density flocks have increased the exposure to diseases such as coccidiosis. The protozoan parasites of the genus *Eimeria* multiply in the intestinal tract and cause tissue damage, with resulting interruption of feeding and digestive processes or nutrient absorption; dehydration; blood loss; and increased susceptibility to other disease agents (16, 17). The short, direct life cycle and high reproductive potential of coccidia in poultry intensifies the potential for severe outbreaks of disease in the modern poultry house (18). Because coccidial oocysts are ubiquitous and easily disseminated in the poultry house environment and have such a large reproduction potential, it is very difficult to keep chickens coccidian free, especially under current intensive rearing conditions (14).

The most common means of spread of coccidia is mechanical, by personnel who move between pens, houses, or farms. Although no natural intermediate hosts exist for the *Eimeria* spp, and ingestion of viable sporulated oocysts, is the only natural method of transmission. Oocysts can be spread mechanically by many different animals, insects, contaminated equipments, wild birds, and dust. Oocysts generally are considered resistant to environmental extremes and to disinfectants,

although a survival time varies with conditions. Oocysts may survive for many weeks in soils, but survival in poultry litter is limited to a few days because of the heat and ammonia released by composting and the action of molds and bacteria. Viable oocysts have been reported from the dust inside and outside broiler houses, as well as from insects in poultry litter. Birds managed on deep litter showed higher incidence of coccidiosis due perhaps to their close contact with the infective oocysts in the litter. The darkling beetle, common in broiler litter, is a mechanical carrier of oocysts. Transmission from one farm to another is facilitated by movement of personnel and equipment between farms and by the migration of wild birds, which may mechanically spread the oocysts (4).

The high incidence of caecal coccidiosis may also be related to the introduction or adding of new birds during the production cycle. Thinning of some patch size was always practiced by many owners. Thinning, by removal of birds from the house at different times, allows some underweight birds to achieve the desired space in order that the birds may increase in size or it is an attempt to suit birds of different size to market size. Risk of disease introduction into the house by catchers is always noticed after 3-4 days from leaving slaughterhouse employees. So the lack of size uniformity is an important constraint in poultry production where the market has requirements for very specific weight categories.

Climate is an important determinant of coccidiosis. Seasonal effect in caecal coccidiosis occurrence was clearly evident, with high rate in rainy humid seasons, spring and autumn. The higher prevalence rate of coccidiosis during the rainy season agrees with reports confirmed that the disease incidence is positively influenced by the warm and humid weather, which characterizes the rainy season period by providing favorable conditions for the growth and development of the infective oocysts (19,20, 21). Adverse weather may affect the management and care of animals, and provide conditions suitable for survival of parasites. In intensively rearing poultry, it is highly required to the careful control and manipulation of their microclimate to remain healthy and production. Knowledge of the exact microclimate requirements and the benefits of different types of housing and ventilation systems were lacking in most of the owners in broiler industry. The seasonal fluctuation in temperatures may also exert its effect on viability of coccidian oocysts; Oocysts may survive for many weeks under optimal conditions but will be quickly killed by exposure to extreme temperatures or drying. Exposure to 55°C or freezing kills oocysts very quickly. Even 37°C kills oocysts when continued for 2—3 days. Threat of coccidiosis is less during hot dry weather and greater in cooler damp weather (1).

Age is probably one of the important variables in occurrence of caecal coccidiosis, because the risk of disease is usually related to age. In our survey, the age of infection with clinical caecal coccidiosis was largely confined to 3-6 weeks of age. Newly hatched birds are sometimes not fully susceptible to infection because of chemotrypsin and bile salts in the intestines cause excystation or because of high maternal antibodies (1). Outbreaks are common at 3-6 weeks of age and are rarely seen in poultry flocks at less than 3 weeks (4). Oocysts in the litter or droppings of broiler chickens are usually most numerous at 4—5 weeks of age and generally decline thereafter (22).

The decline tendency in caecal coccidiosis occurrence was decreased with the increase tendency in coccidiocidal medication of broiler feeds, fed during the last four years of survey. Although not all broiler chicks fed diets amended with

coccidiocidals protected against coccidiosis, this could be explained by the emergence of resistance (23). Some broiler houses have their own farm mill, with reliability to produce medicated or unmedicated feed. Some broiler houses may be fed – under shortage of feed sources – from independent feed mill with unknown what type of coccidiostats or coccidiocidals medication is practiced in these feeds. These anticoccidial drugs containing feeds may be used within the withdrawal period, and so may increase the risk of their residues in slaughtered birds.

The possibilities for caecal coccidiosis control could be achieved by the combination action of hygiene, genetics, vaccines, and drugs (11). Although it is impossible under commercial farming conditions to prevent caecal coccidiosis occurrence, due to impossible elimination of coccidial oocyst chemically from a farm environment, but good hygiene, however, can substantially reduce the numbers of oocysts contamination the environment and, most importantly, can ensure that litter is kept dry so as not to provide good sporulation conditions. By maintaining birds on perforated floors, coccidiosis infection is vastly reduced (24, 15). Although genetic approach to control caecal coccidiosis has not been fully developed; the interest in this strategy is increasing as modern technologies of genetic manipulation developed (15). Vaccination with commercial vaccine “paracox is available and can be used for broilers in drinking water at 5 and 9 days old. (15). the usages of anticoccidials in many broiler patches in NINEVAH governorate were effective in balancing the outcome to the favor of host.

Although coccidiosis is controllable under most circumstances, the cost of control makes the disease one of the most expensive parasitic diseases encountered in the poultry industry. With the increasing interest in poultry production evidenced by the proliferation of poultry farms, it is pertinent to continually evaluate the prevalence and management issues associated with common poultry diseases such as coccidiosis in any given zone. Current efforts towards farm coccidiosis prevention are relying more on vaccination (25, 26, and 27). Continued education and extension services are therefore recommended for poultry farmers in order to update them on the advantages of vaccination and adoption of integrated approach involving good hygienic practices and the use of both drugs and vaccines to prevent this disease. Furthermore, self-diagnosis of common poultry infections such as coccidiosis, which is being practiced, by a good number of the farmers in the study area should be discouraged.

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