THE INCIDENCE OF HELMINTH PARASITISM IN POULTRY IN THE BEKA'A PLAIN IN LEBANON

BY

SARDAR MUHAMMAD ASHIQ HUSSAIN

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POULTRY HELMINTHS IN LEBANON

HUSSAIN

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ABSTRACT

Although the poultry industry has developed tenfold in eight years, there has been no survey of poultry parasites, either in Lebanon or in two of the three adjacent countries.

The present study was made in the Beka'a Valley of Lebanon using three 25-bird samples: (A) scavengers, (B) farm birds reared under poor management, and (C) farm birds reared under good management.

One or more helminth species were found in 96 percent of the scavengers, 84 percent of the poorly managed, and 52 percent of the well managed birds. Only nematode and cestode parasites of the intestinal tract were recovered. The species found were the following: Heterakis gallinae, Ascaridia galli, Dispharynx nasuta, Cheilospirura hamulosa, Raillietina cesticillus, Raillietina echinobothrida, Raillietina tetragona, Davainea proglottina, and Choanotaenia infundibulum.

Scavenger birds were infected with nine species, poorly managed birds with three species, and well managed birds with only one species, Ascaridia galli.

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INTRODUCTION

Except for Palestine (Solomon, 1933), Egypt (Fahmy, 1952; Gaafar, 1952; Mahon, 1958) and Turkey (Tinaz and Kurtpinar, 1950; Kurtpinar, 1958), no work has been reported on the incidence of poultry parasites in the Near and Middle East.

Until 1954, poultry raising in Lebanon was limited to backyard flocks (Assi, 1962). Since that time, the industry has grown very rapidly; Naim (1961), recorded more than five million chicks hatched in 1961 in contrast to fifty thousand in 1954.

Asmar (1960) found a considerable percentage of the chickens brought to the A.U.B. Veterinary Diagnostic Laboratory to be infected with helminths and suggested that a survey of helminths of poultry should be undertaken.

The present work was undertaken with the purposes in mind (i) to survey the helminth parasites of chickens reared in the Beka'a Valley of Lebanon (ii) to relate the incidence of helminths and the worm-burden to rearing practices within the same macro-environment.

MATERIALS AND METHODS

75 locally bred year-old hens were purchased in 3 equal lots from different areas of the Beka'a Valley of Lebanon. Sample A comprised of nondescript scavengers. Samples B and C were White Leghorns raised under different kinds of management at two commercial poultry farms. (For details of ecology and management see Appendix).

Chickens were examined during the period from October 21, 1961 to January 23, 1962. All birds were purchased shortly prior to autopsy and were temporarily housed in battery cages and maintained on commercially pelleted feed.

Cable's (1950) procedure was followed in antemortem examination; postmortem examination was carried out according to Keymers (1961). Parasite collection and fixation was performed as outlined by Baylis (1922).

Cestodes were stained in Mayers acid-alum carmine; nematodes were mounted unstained in glycerine jelly according to standard procedures (Cable, 1950).

PRESENTATION OF DATA

Five species of cestodes and four species of nematodes were found in the total of 75 chickens. Neither trematodes nor acanthocephala were recovered.

The helminths found were:

NEMATODES

Heterakis gallinae (Gmelin, 1790)

Synonyms: *Ascaris gallinae* Gmelin, 1790; *Ascaris vesicularis* Froelich, 1791; *Heterakis vesicularis* (Froelich, 1791); *Heterakis papillosa* Railliet, 1885 (not *Ascaris papillosa* Bloch, 1782).

Ascaridia galli (Schrank, 1788)

Synonyms: *Ascaris galli* Schrank, 1788; *Ascaris gallopavonis* Gmelin, 1790; *Ascaris perspicillum* Rudolphi, 1803; *Ascaris gibbosa* Rudolphi, 1803; *Fusaria inflexa* Zeder, 1800; *Heterakis lineata* Schneider, 1866; *Ascaridia lineata* (Schneider, 1866); *Ascaridia hamia* Lane, 1914.

Dispharynx nasuta (Rudolphi, 1819)

Synonyms: *Spiroptera nasuta* Rudolphi, 1819; *Dispharagus nasutus* (Rudolphi, 1819) Dujardin, 1844; *Dispharagus spiralis* Molin, 1858; *Filaria nasuta* (Rudolphi, 1819) Schneider, 1866; *Dispharagus*

tentaculatus Colucci, 1893; Dispharagus spiralis columbae Bridre, 1910; Acuaria (Dispharynx) nasuta (Rudolphi, 1819) Railliet, Henry and Sisoff, 1912; Acuaria (Dispharynx) spiralis (Molin, 1858) Railliet, Henry and Sisoff, 1912; Cheilospirura nasuta (Rudolphi, 1819) Ransom, 1916; Dispharynx spiralis (Molin, 1858) Skrjabin, 1916; Dispharynx nasuta (Rudolphi, 1819) Stiles and Hassal, 1920; Dispharynx stonae Harwood, 1933.

Cheilospirura hamulosa (Diesing, 1851)

Synonyms: Spiroptera hamulosa Diesing, 1851; Dispharagus hamulosus (Diesing, 1851); Acuaria hamulosa (Diesing, 1851); Spiroptera perforans Centoscudi, 1911.

CESTODES

Raillietina cesticillus (Molin, 1858)

Synonyms: Taenia infundibuliformis Dujardin, 1845; Taenia cesticillus Molin, 1858; Davainea cesticillus Blanchard, 1891; Raillietina cesticillus (Molin, 1858) Joyeux, 1923; Brumptiella cesticillus Lopez-Neyra, 1931.

Raillietina echinobothrida (Megnin, 1881)

Synonyms: Taenia echinobothrida Megnin, 1881; Taenia infundibuliformis (Goeze, 1782); Davainea

echinobothrida (Megnin, 1880); Davainea paraechinobothrida Magalhaes, 1898; Raillietina echinobothrida (Megnin, 1881) Fuhrmann, 1924; Kotlania echinobothrida Lopez-Neyra, 1931; Kotlania grobbeni Lopez-Neyra, 1931.

Raillietina tetragona (Molin, 1858)

Synonyms: Taenia tetragona Molin, 1858; Davainea tetragona (Molin, 1858); Taenia bothrioplitis Piana, 1881; Monocercus davaineae tetragonae Railliet, 1893; Raillietina tetragona (Molin, 1858) Joyeux, 1927; Kotlania tetragona Lopez-Neyra, 1931.

Davainea proglottina (Davaine, 1860)

Synonyms: Taenia proglottina Davaine, 1860; Davainea varians Sweet, 1910; Davainea dubius Meggitt, 1916; Cysticercoides taeniae-proglottinae (Davaine, 1860).

Choanotaenia infundibulum (Bloch, 1779)

Synonyms: Taenia infundibulum Bloch, 1779, Drepanidotaenia infundibuliformis (Goeze, 1782) Railliet, 1893; Choanotaenia infundibuliformis (Goeze, 1782) Railliet, 1896.

echinobothrida (Megnin, 1880); Davainea paraechinobothrida Magalhaes, 1898; Raillietina echinobothrida (Megnin, 1881) Fuhrmann, 1924; Kotlania echinobothrida Lopez-Neyra, 1931; Kotlania grobbeni Lopez-Neyra, 1931.

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Sample A

Sample A (scavenger birds) was found to be the most heavily infected of the three groups, both as to the number of species and the overall worm-burden. Twenty-four birds (96 percent) were infected with one to five species of worms (Tables 1, 2). The average chicken of this group had 2.25 species of helminths; the average worm-burden per infected bird was 55 nematodes and 5 cestodes.

Sample B

Of 25 birds in sample B, 21 (84 percent) were infected (Table 1). 16 chickens were infected with one species; 5 chickens carried multiple infections at the time of examination (Table 2). The average chicken had 1.24 species of helminths; the average worm-burden per infected bird was 6.3 nematodes and 0.1 cestodes.

Sample C

Only 13 chickens (52 percent) of sample C were found infected. Ascaridia galli was the only parasite encountered with an average worm-burden per infected bird of 7.85 (Table 1).

Table I

PERCENTAGE INCIDENCE AND WORM-BURDEN OF CHICKENS UNDER DIFFERENT FORMS OF MANAGEMENT

	Sample A		Sample B		Sample C	
	Incidence %	Worm burden per infected bird Average - Range	Incidence %	Worm burden per infected bird Average - Range	Incidence %	Worm burden per infected bird Average - Range
Nematodes						
Heterakis gallinae	84	56.6 (3-164)	52	4.6 (2-16)	0	0.0 ---
Ascaridia galli	32	12.6 (1-45)	48	6.0 (1-34)	52	7.9 (1-35)
Dispharynx nasuta	20	5.8 (4-8)				
Cheilospirura hamulosa	4	1.0 (1-1)				
Cestodes						
Raillietina cesticillus	32	7.3 (1-18)	4	2.0 (2-2)		
Raillietina echinobothrida	24	4.5 (1-17)				
Raillietina tetragona	4	2.0 (2-2)				
Davainea proglottina	8	6.5 (6-7)				
Choanotaenia infundibulum	8	10.5 (4-17)				

Table 2

PERCENTAGE INCIDENCE OF MULTIPLE INFECTIONS IN CHICKENS REARED UNDER DIFFERENT FORMS OF MANAGEMENT

No. of Infections	Sample A	Sample B	Sample C
None	4%	16%	48%
1	20%	64%	52%
2	48%	20%	
3	16%		
4	8%		
5	4%		

DISCUSSION

This study is one of the first concerned with helminth parasites of poultry in Lebanon, and was undertaken in view of the rapidly developing industry in this country.

The five species of cestodes and four species of nematodes found are all well known poultry parasites thruout the world. This study, however, constitutes the first record of their identification from the Beka'a Valley of Lebanon.

Sample A (scavengers) had access to many types of intermediate hosts, such as ants for Raillietina echinobothrida and Raillietina tetragona (John and Horsfall 1936; Harkema 1943); carabid beetles for Raillietina cesticillus (Wetzel, 1933); various slugs for Davainea proglottina (Ackert 1919; Brown 1933); the house fly for Choanotaenia infundibulum (Ackert, 1919); flour beetles, manure beetles, weevils, sandhoppers, grasshoppers and amphipods for Cheilospirura humulosa (Alicata, 1937); and pillbugs and sowbugs for Dispharynx nasuta (Cram, 1931). The closer confinement of samples B and C apparently reduced the chance contacts with such intermediate hosts. With the exception of a single bird in sample B infected by Raillietina cesticillus, the only parasites found in the latter groups were those with direct host-host cycles.

The distribution of intermediate hosts is known to depend upon the climate and other environmental factors. Todd (1947, 1948) observed heavier infections in chickens raised on pastures and gave as his explanation that the vegetation afforded a better environment for survival and development of infective stages. Such birds not only showed heavy worm burdens, but also a comparatively larger number of species. Thompson (1950), Taylor (1933), and Ranby (1957) described heavy parasitic infections of poultry as a result of poor husbandry methods, such as the running of young with old birds, long grass and weeds on pasture, overstocking, high degrees of humidity in houses and on pasture, unsuitable accomodation, poor nutrition and erroneous feeding methods. Range chickens are likely to be exposed to all these hazards.

Dehydration and temperature changes causing alternate activation and inactivation combine with the role of bacteria and molds, predatory arthropods and the aging of birds, to assist in the destruction of helminth eggs at or near the soil surface (Lund, 1960). While discussing such factors, Lund (l.c.) suggested that soil, a few inches beneath the surface, was the habitat of the infective stages which were brought to the surface by earthworms, insect larvae and other agents, and were consequently ingested by chickens. He also confirmed the findings of Todd (1948) that dense vegetation in plots assisted in maintaining

heavy infections in poultry.

The effects of temperature and humidity on soil-borne helminths have been studied by Feoktistov (1950). He domonstrated that there is a destruction of eggs and larvae when they are exposed to direct sunshine.

According to the findings of Todd (1948) and Yutuc and Oyzon (1950), the local chickens in sample A should have shown more resistance to infection than the White Leghorns of samples B and C, but as the conditions of rearing were so markedly different in the present study, comparison on this basis cannot be done.

Levine (1938) and Reid (1945) have shown adverse effects on worms due to poor diet and starvation of the host, contrary to the findings of Luttermoser and Allen (1941), Todd (1951), Reidel and Ackert (1951), Seifried (1933), and Ackert and Dewhirst (1950). Deo and Srivastava (1954) could not reduce the resistance of birds to Heterakis gallinae by keeping chickens on a diet deficient in proteins, vitamins, and minerals. Similarly Todd (1951) could not confirm that methionine enhances resistance against Ascaridia. The low worm burden and comparatively few species affecting samples B and C suggests the effects of confinement factors without considering host diet to be important in the present study.

Good confinement practices have likewise been stressed by Cram (1936), who felt that any invertebrate allowed access to the poultry house could prove to be an intermediate host. She did not believe any other environmental factor to be involved.

The low overall incidence of parasites in samples B and C cannot be attributed to deworming practices in farm birds in agreement with Reid (1958) who felt that these should not be considered as satisfactory control measures. In fact, the high incidence of Ascaridia galli in both these samples tends to show that although the average worm-burden is slightly lower, the effect of drugs on overall incidence is negligible.

The higher incidence of parasites in sample B as compared with sample C cannot be attributed to the material of the floor below the litter. It was demonstrated by Reidel (1951), that there was no statistical difference in infections in chickens raised on deep litter on concrete floor in comparison with deep litter without such flooring.

The recovery of two specimens of Raillietina cesticillus from sample B in addition to Ascaridia galli and Heterakis gallinae, which have direct life cycles (Morgan and Hawkins, 1960), is interpreted as a chance occurrence: this bird may have escaped confinement at one time in the past or an infected beetle may once have entered into the enclosure.

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The apparent absence of Heterakis gallinae from the well maintained farm may be attributable to vigilant management; the apparently heavier burden of Ascaridia galli in sample C as compared with sample B is not significant and is probably the result of sample size.

SUMMARY

Three 25-bird samples (all hens) were obtained from different places in the Beka'a Valley and surveyed for their helminth parasites.

Sample A comprised scavenger birds; samples B and C were White Leghorns reared in confinement under poor and good forms of management respectively.

96 percent of the birds in sample A, 84 percent in sample B, and 52 percent in sample C were found infected. Scavenger-birds were infected with Heterakis gallinae 84%, Ascaridia galli 32%, Dispharynx nasuta 20%, Cheilospirura hamulosa 4%, Raillietina cesticillus 32%, Raillietina echinobothrida 24%, Raillietina tetragona 4%, Davainea proglottina 8%, and Choanotaenia infundibulum 8%. The average worm-burden per infected bird was 55 nematodes, and 5 cestodes.

Birds of sample B contained Heterakis gallinae 52%, Ascaridia galli 48%, and Raillietina cesticillus 4%. The average worm-burden per infected bird was 6.3 nematodes, and 0.1 cestodes.

Birds of sample C were infected only with Ascaridia galli. The average worm-burden per infected bird was 7.85.

Findings tend to indicate that management efficiency reflects markedly both on the number of species and the worm-burden of infected chickens.

LITERATURE CITED

Ackert, J.E. 1919. On the life history of Davainea proglottina, a fowl tapeworm. Jour. Parasitol. 5:41-43.

------ and Dewhirst, L.W. 1950. Resistance of fowls to parasitism affected by female sex hormone. Jour. Parasitol. 36:16.

Alicata, J.E. 1937. The gizzard-worm Cheilospirura hamulosa, and its transmission to chickens in Hawaii. Cir. Hawaii Agric. Exp. Sta. 11:7.

Asmar, J. 1960. Personal communication.

Assi, A. 1962. Lebanon consumes 3,900,000 chicken per year. Echo (Beirut) 1:9-13.

Baylis, H.A. 1922. Notes on the collection and preservation of parasitic worms. Parasitology 14:402-408.

Brown, F.J. 1933. Life history of the fowl tapeworm, Davainea proglottina. Nature Lond. 131:276-277.

Cable, R.M. 1950. An Illustrated Laboratory Manual of Parasitology, Burgess Publishing Co., Minneapolis. pp. 105, 109-122.

Cram, E.B. 1931. Developmental stages of some nematodes of the Spiruroidea parasitic in poultry and game birds. Tech. Bull. U.S. Dept. Agric. 227.

------. 1936. Notes concerning internal parasites of poultry in Puerto Rico. Agr. Notes No. 70, Puerto Rico Agr. Exp.

Sta. U.S.D.A. (Helm. Abst. 1936. 5:414a).

Deo, P.G. and Srivastava, H.D. 1954. Studies on the effects of different deficient diets upon the natural resistance of chickens to Heterakis gallinae (Gmelin, 1790) Freeborn, 1923. Proc. 41st Indian Sci. Congr: (1954) Part 3:223 (Helm. Abst. 1954 23:872r).

Fahmy, M.A.N. 1952. New records of ecto and endoparasites of chickens in Egypt with special reference to taxonomy of Subulura brumpti. Jour. Parasitol. 38:184.

Feoktistov,, P.I. 1950. (Epizootology and prophylaxis of ascaridiasis of fowls) Veterinariya 27:11-16 (In Russian) (Helm. Abst. 1950 19:132e).

Fetter, G.C. 1961. Attitudes towards selected aspects of rural life and technological change among central Beka'a farmers. Faculty Agr. Sci. A.U.B. Publication No. 13, p. 6.

Gaafar, S.M. 1952. Incidence of infection with the fowl nematode Ascaridia galli in Egyptian chickens. Jour. Parasitol. 38:84-85.

Harkema, R. 1943. The cestodes of North Carolina poultry with remarks on the life history of Raillietina tetragona. J. Elisha Mitchel Sci. Soc. 59:127 (Helm. Abst. 1943 12:175a).

Jones, M.F. and Horsfall, M.W. 1936. The life history of a poultry cestode. Science 83:303-304.

Keymer, I.F. 1961. Postmortem examinations of pet birds. Modern Vet. Practice 42:47-51.

Kurtpinar, H. 1958. Les maladies parasitaires des animaux domestiques en Turquie et les moyens de lutte contre elles. Bull. Off. Int. Epiz. 49:568-585.

Levine, P.P. 1938. Observations on the biology of the poultry cestode Davainea proglottina in the intestine of the host. Jour. Parasitol. 24:423-431.

Lund, E.E. 1960. Factors influencing the survival of Heterakis and Histomonas on soil. Ibid. 46:38.

Luttermoser, G.W. and Allen, R.W. 1942. The influence of diets high and low in protein on the growth rates of chickens infected with the tapeworm, Raillietina cesticillus. Poult. Sci. 21:111-115.

Mahon, J. 1958. Helminth parasites of reptiles, birds, and mammals of Egypt. V. Avian cestodes. Canad. J. Zool. 36: 577-605 (Helm. Abst. 1958. 27:107i).

Morgan, B.B. and Hawkins, P.A. 1960. Veterinary Helminthology. Burgess Publishing Co., Minneapolis, pp. 283, 287.

Naim, M.S. 1961. Unpublished data. Afforded by courtesy of Dr. G.H. Ward.

Ranby, P.D. 1957. Importance of roundworms in Poultry. Queensland Agric. J. 83:529-533. (Helm. Abst. 1957. 26:280c).

Reid, W.M. 1945. The relationship between glycogen depletion in the nematode Ascaridia galli (Schrank) and elimination of the parasite by the host. Amer. Jour. Hyg. 41:150-155.

---------. 1958. Incidence of helminth and external parasites in Georgia broilers. Poult. Sci. 37:586-592.

Reidel, B.B. 1951. Ascarid infections in broilers raised on dirt and concrete floors. Ibid. 30:18-20.

---------. and Ackert, J.E. 1951. Quantity and source of proteins as factors in the resistance of chickens to ascarids. Ibid. 30:497-502.

Seifried, O. 1933. Die Zusammenhange A-Avitaminose, Infektion and Parasitismus bei Huhnern. Munch. Tierarztl. Wschr. 84:540-544. (Helm. Abst. 1933 2:271a).

Solomon, S.G. 1933. Faunistic note on a collection of helminthic material from Palestine. Jour. Helminth. 11:1-8.

Taylor, E.L. 1933. The parasitic worms of poultry, and the diseases which they cause. Harper Adams Util. Poult. J. 18:209-215. (Helm. Abst. 1933 2:255a).

Thompson, J.J. 1950. Methods of controlling poultry parasites. N.Z. J. Agric. 81:155, 157, 159, 161-162. (Helm. Abst. 1950 19:216a).

Tinaz, A. and Kurtpinar, H. 1950. Karacabey harasi tavuklarinda Acuaria (Cheilospirura) hamulosa (Diesing, 1857) ve Subulura differens (Sonsino, 1890) in mevcudiyeti. Turk vet.

Hekim. Dern. Derg. 20:202-206. (English Summary) (Helm. Abst. 1950. 19:841b).

Todd, A.C. 1947. Helminth infections in chickens in Tennessee. Poult. Sci. 26:469-474.

---------. and McSpadden, B.J. 1947. Pastures for chickens and their relation to the parasitic fauna. Ibid. 26:576-581.

---------. 1948. Pastures for chickens and the parasitic fauna. Ibid. 27:646-647.

---------. and Culton, T.G. 1949. On naturally acquired helminth infections in hybrid and standard bred chickens. Ibid. 28:84-86.

---------. 1951. Effect of antibiotic agents upon experimental Ascaridia galli infections in chickens. Ibid. 30:763-766.

---------. 1951. Supplemental methionine in the diet and growth of parasitised chicks. Ibid. 30:820-824.

Wetzel. 1933. Zur Kenntnis des Entwicklungskreises des Huhner-bandwurmes Raillietina cesticillus. Dtch. Tierarztl. Wschr. 41:465-467. (Helm. Abst. 1933 2:156a).

Yutuc, L.M. and Oyzon, D.K. 1950. Comparative resistance of native with two imported breeds of chickens to Ascaridia lineata (Schneider). Philipp. J. Sci. 79:241-247. (Helm. Abst. 1950 19:715b).

APPENDIX

APPENDIX

TOPOGRAPHY, SOIL AND CLIMATE OF THE BEKA'A VALLEY OF LEBANON

The Beka'a Valley is an extension of the Jordan and Great Rift Valleys lying east of the coastal Lebanon mountain range and west of the Anti-Lebanon chain extending along the Syrian border. The average altitude is about 800 meters. The soil is generally calcareous, and low in humus, nitrogen, and phosphorus (Fetter, 1961). Soil profiles vary to some extent.

Summers are hot and dry; winters cold. In August the maximum temperature is 33.07 degrees; the minimum temperature during winter may be as low as -5 degrees centigrade. Compared with the coastal strip, the humidity is low; 400 mm. being the average rainfall per year. Prevailing winds are westerly.

Meteriological Data Beka'a Valley, Lebanon.[1,2]

Month	Temperature @ 18:00		Hygrometry @ 12:00			Rainfall mm.
	Max. C	Min. C	Dry bulb	Wet bulb	Relative humidity	
1961						
January	10.12	1.02	7.25	5.31	76.73	76.1
February	9.56	0.58	6.07	3.88	71.53	58.9
March	13.91	1.02	8.99	5.53	61.06	43.1
April	20.56	5.22	14.55	9.74	57.53	25.6
May	26.60	9.46	19.55	12.00	41.14	1.8
June	30.40	13.21	23.40	14.50	37.93	0.0
July	33.20	13.80	26.30	15.80	32.70	0.0
August	34.20	13.10	27.20	16.60	33.24	0.0
September	27.43	9.95	21.63	14.92	50.20	3.0
October	25.38	8.38	19.52	15.23	62.39	5.8
November	17.54	4.71	12.57	9.04	64.62	41.1
December	11.85	4.08	9.19	7.31	77.82	138.5
1962						
January	10.32	2.28	7.48	5.73	78.63	93.1

[1]Double rulings indicate the period of study.

[2]Data recorded at A.U.B. Farm. By courtesy of Mr. Salah S. Abu-Shakra.

SAMPLE A: SCAVENGER BIRDS[1]

Record Report

Name of investigator: SARDAR MUHAMMAD ASHIQ HUSSAIN

1. Owner's name: SAMPLE A

2. Location of Farm: TALIA, 3 KM. FROM A.U.B. FARM

Year of establishment: _____

3. Date samples were collected: 20.x.1961

4. Method of rearing: Range / ~~Confinement~~

5. Description of immediate surroundings:

a) Type of land: CALCAREOUS SOIL PARTIALLY INHABITED

Utilization and management: CULTIVATED

b) Vegetation: ABUNDANT

c) Other type of livestock under management: CATTLE, HORSES, DONKEYS, TURKEYS, PIGEONS, DUCKS.

d) Seasonal status of surface water: RAINFED LAND, SURFACE WATER AND COLLECTIONS ABSENT.

e) Fence: Absent / ~~Present~~

f) Size of land: UNLIMITED

6. Annual rainfall in mm.: 400 MM.

7. Average annual temperature: Day 21.73°C Night 7.05°C

8. Prevailing wind direction (Seasonal): WESTERLY

9. Number of birds under management: Males 50 Females 200

Breed: NONDESCRIPT LOCAL Age: ONE YEAR

[1]Remainder of form not applicable for this sample. See Samples B and C.

SAMPLE B: POORLY MANAGED FARM BIRDS

Record Report

Name of investigator: SARDAR MUHAMMAD ASHIQ HUSSAIN

1. Owners name: SAMPLE B

2. Location of Farm: BAALBEK, 15 KM. FROM A.U.B. FARM

Year of establishment: 1960

3. Date samples were collected: 25.xi.1961

4. Method of rearing: Confinement. / ~~Range~~

5. Description of immediate surroundings:

a) Type of land: CALCAREOUS SOIL

Utilization and management: NIL

b) Vegetation: NIL

c) Other type of livestock under management: NIL

d) Seasonal status of surface water :

e) Fence: Present / ~~Absent~~

f) Size of land: 400 SQ. METERS

6. Annual rainfall in mm.: 400 MM.

7. Average temperature: Day 21.73°C Night 7.05°C

8. Prevailing wind direction (seasonal): WESTERLY

9. Number of birds under management: Males: NIL Females: 500

Breed: WHITE LEGHORN Age: ONE YEAR

10. Poultry house:

a) Size:

Length: 50 FT. Width: 20 FT. Height: 9FT.

b) Accomodation capacity: 400

Percentage utilized: 125 PERCENT

c) Material:

~~Brick~~ / ~~Cutstone~~ / Concrete hollow block / Wood / Metal

d) Roofing material: CORRUGATED GALVANIZED SHEETS

e) Windows:

Type: PERMANENT WITHOUT PANES, WIREMESH

Size: '2 x '2 x 4 Total surface: 16 SQ. FEET / p.c. 1.6

Distribution and location: 2 ON WEST; 2 ON EAST, 7 FEET FROM FLOOR

f) Doors:

Type: WOODEN SINGLE

Size: '3½ x '5½ Total surface: 19.25 SQ. FEET.

Distribution and location: ONE ON EAST

g) Number of sections: TWO

Material of partitions: WIRE MESH

Dimensions of sections: TWO EQUAL HALVES; '50 x '10; '50 x '10

h) Floor:

Surface: 1000 SQ FEET Nature: NONABSORBENT Material: ROCKY

i) Protection:

Flies and other insects: WIRE MESH ON WINDOWS

Other vermin: NIL

Other animals: PLOT PROTECTED BY WALL AND GATES.

11. Sketch, overall layout of farm: _____

12. Sketch, overall layout of poultry building: _____

13. Equipment:

a) Feeders:

Type: LOCAL, GALVANISED SHEETS Number: 20

Dimensions: 2 METERS LONG Location: EVENLY DISTRIBUTED

Capacity in capita: 8 CM./BIRD

Sanitary condition: FAIR

b) Waterers:

Source of water: WELL WATER

Type of waterer: FOUNTAINS Number: 5

Dimesnions: 5 GALLON CAPACITY Location: EVENLY DISTRIBUTED

Capacity per capita: 6 GALLONS/100 BIRDS.

Sanitary condition: FAIR

c) Laying nests:

Type: COMMUNITY NESTS Number: 50

Dimensions: 'l x 'l x 'l Location: ALONGSIDE WALL IN ONE ROW

Capacity: ONE PER PEN

d) Perches:

Type: _____ Number: NIL

Dimesnions: _____ Location: _____

Capacity per capita: _____

14. Litter:

Type of material: WOOD SHAVINGS Thickness: 10 CM.

Compactness: CAKED PATCHES Distribution: EVEN

Condition around waterers: SLIGHTLY MOIST

Frequency of renewel: FRESH LITTER ADDED EVERY MONTH

Frequency of stirring: ONCE A MONTH

Chemical or other admixtures to litter: HYDRATED LIME

15. Prevailing atmospheric conditions:

(on day of survey)

Degree of humidity: 60 DEGREES

Gaseous pollution: AMMONIA

Nongaseous pollution: NIL

16. Feed:

Brand: Commercial

Kind of storage: IN ORIGINAL PAPER BAGS

Chemical additives: NIL

Antibiotics: NIL

Green feed supplements: NIL

17. Disposal of manure:

Location: PILE, 10 METERS DISTANCE FROM POULTRY HOUSE

Method of disposal: SOLD TO FARMERS EVERY 3 MONTHS.

Accessibility to chickens: NIL

Presence of coprophagous insects: ABUNDANT

18. Use of insecticides:

What preparations: D D T

Frequency of application: EVERY SIX MONTHS

Modus of application: SPRAY

19. Use of anthelmintics:

What preparation: PIPERAZINE COMPOUND

Frequency of administration: ONLY ONCE BEFORE HOUSING

Modus of administration: IN DRINKING WATER

20. General management practices:

Productivity of farm: 60 PERCENT

Rearing of replacement stock: BROODERS

Debeaking: PRACTICED

Accessibility of farm to strangers: NIL

Supervision of farm and management: OWNER

21. Diseases position:

Diseases encountered during the last 12 months: NIL

" " " " " 24 " : NIL

" " " " " 30 " : NIL

Method of combat applied: NIL

Results: _____

22. Deficiencies:

Minerals: NIL

Vitamins: NIL

Others : NIL

SAMPLE C: WELL MANAGED FARM BIRDS

Record Report

Name of investigator: SARDAR MUHAMMAD ASHIQ HUSSAIN

1. Owners name: SAMPLE C

2. Location of farm: BAYAK, 14 KM. FROM A.U.B. FARM

   Year of establishment: 1958

3. Date samples were collected: 15.1.1962.

4. Methods of rearing: Confinement / ~~Range~~

5. Description of immediate surroundings:

   a) Type of land: CALCAREOUS SOIL

      Utilization and management: NIL

   b) Vegetation: TREES ONLY

   c) Other type of livestock under management: NIL

   d) Seasonal status of surface water: VICINITY OF RIVER, OPEN RESERVOIR

   e) Fence: Present / ~~Absent~~

   f) Size of land: 600 SQ. METERS

6. Annual rainfall in mm.: 400 MM.

7. Average temperature: Day 21.73°C Night 7.05°C

8. Prevailing wind direction: WESTERLY

9. Number of birds under management: Males: NIL Females: 2500

   Breed: WHITE LEGHORN Age: ONE YEAR

10. Poultry house:

    a) Size:

       Length: '100 Width: '30 Height: '8

b) Accomodation capacity: 1000 BIRDS

Percentage utilized: 80 PERCENT

c) Material:

Concrete hollow block / Wood / Metal

d) Roofing material: CARDBOARD CEILING FOR INSULATION,
CORRUGATED GALVANIZED SHEETS

e) Windows:

Type: TILTING

Size: '3 x '260 Total surface: 780 SQ. FEET / p.c. 26.0

Distribution and location: 4.5 FEET ABOVE FLOOR ALL AROUND
THE BUILDING

f) Doors:

Type: WOODEN SINGLE

Size: '3 x '6 Total surface: 18 SQ. FEET

Distribution and location: ONE MIDWAY ON WEST SIDE

g) Number of sections: TWO

Material of partitions: UP TO '2 CONCRETE WALL, ABOVE
UP TO ROOF "$\frac{1}{2}$ WIRE GAUZE

Dimensions of sections: '100 x '15 ; '100 x '15

h) Floor:

Surface: 3000 SQ. FEET Nature: NONABSORBENT Material: CONCRETE

i) Protection:

Flies and other insects: WIRE MESH

Other vermin: PROTECTIVE WATER CHANNEL ALL AROUND BUILDING

Other animals: PLOT PROTECTED BY GATES AND FENCE

11. Sketch, overall layout of farm:

12. Sketch, overall layout of poultry building:

13. Equipment:

a) Feeders:

Type: LOCAL, GALVANIZED SHEETS WITH PROTECTIVE REELS

Number: 40

Dimensions: 2 METERS LONG Location: EVENLY DISTRIBUTED

Capacity in capita: 8 CM.

Sanitary condition: CLEAN, NOT CONTAMINATED BY EXCRETA

b) Waterers:

Source of water: RAIN WATER STORED IN TANK AND PUMPED THROUGH PIPES.

Type of waterer: AUTOMATIC FLOATING VALVE SYSTEM

Number: 7

Dimensions: 2 M x 30 CM x 20 CM. Location: SCATTERED EVENLY

Sanitary condition: CLEAN Capacity per capita: 3 CM. OF LINEAR SPACE

c) Laying nests:

Type: WOODEN BOXES

Dimensions: 'l x 'l x 'l Location: ALONGSIDE WALLS, 40 CM. ABOVE THE GROUND.

Capacity: ONE PER FIVE

d) Perches:

Type: DROPPING PITS

Number: 15

Dimensions: 4 x .5 METERS Location: SCATTERED EVENLY

Capacity per capita: 12 CM./BIRD

14. Litter:

Type of material: WOOD SHAVINGS Thickness: 15 CM

Compactness: LOOSE Distribution: EVEN

Condition around waterers: FAIRLY DRY

Frequency of renewel: FRESH LITTER ADDED EVERY TWO WEEKS

Frequency of stirring: TWICE A MONTH

Chemical or other admixtures to litter: HYDRATED LIME AND AGROCIDE

15. Prevailing atmospheric conditions:

(on day of survey)

Degree of humidity: 61 DEGREES

Gaseous pollution: NIL

Nongaseous pollution: NIL

16. Feed:

Brand: Commercial / ~~Non-Comercial~~

Kind of storage: CONCRETE BINS

Chemical additives: NIL

Antibiotics: NIL

Green feed supplements: NIL

17. Disposal of manure:

Location: NO STORAGE

Method of disposal: SOLD TO FARMERS UPON REMOVAL

Accessbility to chickens: NIL

Presence of coprophagous insects: NIL

18. Use of insecticides:

What preparations: MALATHION & AGROCIDE

Frequency of application: ONCE EVERY 45 DAYS

Modus of application: SPRAY AND ADMIXTURE TO LITTER

19. Use of anthelmintics:

What preparation: PIPERAZINE COMPOUND

Frequency of administration: ONCE BEFORE HOUSING

Modus of administration: IN DRINKING WATER

20. General management practices:

Productivity of farm: 80 PERCENT

Rearing of replacement stock: BROODERS

Debeaking: PRACTICED

Accessibility of farm to strangers: DISCOURAGED

Supervision of farm and management: OWNER

21. Disease position:

Diseases encountered during the last 12 months: NIL

" " " " " 24 " : NIL

" " " " " 30 " : ONE COCCIDIOSES OUTBREAK

Method of combat applied: SULMET

Results: SATISFACTORY

22. Deficiencies:

Minerals: NIL

Vitamins: NIL

Others: NIL