Int.J.Curr.Res.Aca.Rev.2018; 6(2): 75-82

EXCELLENT PUBLISHERS

International Journal of Current Research and Academic Review

ISSN: 2347-3215 (Online) Volume 6 Number 2 (February-2018)

Journal homepage: http://www.ijcrar.com

doi: https://doi.org/10.20546/ijcrar.2018.602.009

Assessment of Therapeutic Medicine Usage Pattern in Commercial Poultry Layer Farms

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Abstract

A study was conducted to assess the therapeutic medicine usage pattern in commercial layers in Namakkal district. The data for the period 2016-17 was collected during the months of December 2016 to February 2017 from 60 commercial layer farms selected randomly from four blocks of Namakkal district by using multistage random sampling technique. The sample commercial layer farms were classified into three groups; small (up to 50,000 birds), medium (50,001-2,00,000 birds) and large (2,00,001 and above birds). Of the 60 farms surveyed, 29 (48.34 per cent) farmers were using medicines mainly for therapeutic purpose, 20 farmers (33.33 per cent) were using medicines for therapeutic and prophylactic purpose and remaining 11 (18.33 per cent) were using medicines for prophylactic purpose. Drugs were administered mostly through drinking water (39 farms - 65.00 per cent) and next preferred route was through feed (15 farms - 25.00 per cent). Most of the farmers (46) purchased medicines based on veterinarian advice (76.67 per cent) and 23.33 per cent of the (14) farmers who had been doing business for the long time were using medicines on their own. Most of the farmers (46) purchased medicines based on veterinarian's prescription (76.67 per cent) and 23.33 per cent of the (14) farmers were using medicines on their self-prescription. All the 60 farms were administering medicines at morning hours (100.00 per cent) and none of the farmers were administering the medicines in the evening hours.

Article Info

Accepted: 30 January 2018
Available Online: 20 February 2018

Keywords

Poultry commercial layer,
Medicine usage – purpose,
Mode of medication,
Time of use of medicine,
Point of use of medicine,
Conduction of postmortem,
Withdrawal period.

Introduction

Livestock sector plays a major role in India's rural economy especially poultry sector in India is one of the fastest growing segments of agricultural sector and it has undergone a paradigm changes in structure and operation. Various technological interventions such as introduction of hybrid layer and broiler, elevated cage system of rearing, automation in feeding, watering and egg collection, least cost feed formulation etc., which were introduced during 1980-90's augmented the production and productivity of both commercial layers and broilers. According to Annual Report 2016-17, the egg production in India was 82.93 billion eggs and poultry meat production was 3.26 million tonnes in the year 2015-16. Per capita availability of eggs in India has also increased from just 5 eggs per annum in 1950-51 to 66 eggs per annum in 2015-16 which is still far below the ICMR recommendation of 180 eggs / annum. The growth of poultry sector in India is mainly because of demand driven pressure without much support from government. Though the production has increased, it is

not without its own drawbacks such as increased usage of medicines, antibiotics, prebiotics, probiotics, heat stressors, growth promoters etc. Further, the increased use of these prophylactic and therapeutic supplements resulted in increased drug resistance among commercial layers. Antimicrobial drugs are essential in poultry production and these drugs are used to prevent infectious and non-infectious diseases, assist in converting stress due to environmental changes, vaccination, debeaking and other management practices (Dafwang *et al.*, 1987). Antibiotics in commercial layer farms can be divided into two categories: therapeutics and growth promotants (Singer and Hofacre, 2006). Antibiotics are used in poultry production not only for therapeutic purposes but also for growth promoting purposes and residues can be detected in eggs and poultry meat if proper withdrawal protocols are not followed (Diaz- Sanchez *et al.*, 2015). Antimicrobials are used in poultry feeds at sub-therapeutic levels for growth improvement, prevention or reduction of disease outbreaks, improving digestion, acceleration of weight gain and increasing feed conversion ratio (Donoghue, 2003; Dibner and Richards, 2005 and Sawant *et al.*, 2005). Antibiotics used in food animals are also used in humans and these abuse of antibiotics in food-animal production is one of the most important factor contributing to the global surge and spread in antibiotic resistance (Singer and Hofacre, 2006; Boamah *et al.*, 2016 and Kamini *et al.*, 2016). The widespread access to antibiotics without prescription with resultant inappropriate use, may lead to increased development of resistant strains (Nakajima *et al.*, 2010 and Geidam *et al.*, 2012). Farmers and producers had a lack of knowledge about antimicrobial residues, their withdrawal periods and the risk posed by the consumption of these residues (Sirdar *et al.*, 2012 and Kabir *et al.*, 2004).

Research gap

In case of Agricultural sector, data on fertilizer, pesticides, water and electricity usage over the time period is available. Globally pesticide sales reached to 32.9 billion US dollar in the year of 2006. In India, the total chemical pesticide consumption was 57353 units in the year of 2014-15 and per capita pesticide consumption in India was 0.6 kg/ha and in Namakkal district, it was estimated as 39345 kg/year. In Namakkal district, chlorpyrifos was used broadly as a pesticide (Kavitha and Sureshkumar, 2016). Poultry industry is also using different antibiotics for different purposes but the reliable data about the quantity and patterns of usage such as dose and frequency of drugs use is not available (Samarh *et al.*, 2006 and Carrique-Mas *et al.*, 2013). At present, there is no data available on therapeutic supplements usage in layers such as purpose for which the medicine is used, mode of medication, source of purchase, source of prescription, time of use of medicine which would be extremely helpful for the government and policy makers. Hence, the present study attempts to explore the medicine usage patterns in commercial layer farms which would be helpful in identifying the relationship between therapeutic supplements usage in commercial layers which hampers the policy makers and planners in drawing a blue print for the development of poultry farms.

Materials and Methods

Selection of study area

Namakkal in Tamil Nadu is the country's second-largest egg producing centre, Andhra Pradesh being the first. About 80 per cent of the layer farms in Tamil Nadu are concentrated in and around Namakkal. Out of the total 32 districts of Tamil Nadu State, Namakkal district was purposively selected for this study for its unique blend of poultry husbandry and industry.

Sampling procedure

Multistage random sampling technique was adopted to choose the final sixty commercial layer farms. In the first stage, out of the 15 blocks of Namakkal district, four blocks viz., Namakkal, Rasipuram, Paramathi velur and Thiruchengode were chosen randomly. Consequently in the second stage, 3 villages from each of the chosen block were selected at random and in the third stage, 5 farms from each of the sample village were selected randomly.

Method of enquiry and collection of data

The required primary data were collected through a well-structured interview schedule and it was pre-tested. The sample respondents were interviewed personally. The purpose of the study was briefly and clearly explained to the sample respondents to help them understand and respond better and entice their cooperation. Since much of the information were collected through recall by respondents, careful attention was taken while preparing the interview schedule by incorporating appropriate words and also at the time of interview in expressing the words to minimize bias, if any. To achieve the objectives of the study, relevant data were collected from the

respondent farmers by personal interview, using pretested interview schedule.

Tools of analysis

Percentage analysis was employed to analyze the usage of therapeutic supplements which includes purpose of medicine used, mode of medication, source of purchase, source of prescription, time of use of medicine followed in the commercial layer farms of Namakkal district.

Fisher exact analysis was used to calculate the exact probability of the table of observed cell frequencies.

If margins of a table are fixed, the exact probability of a table with cells a, b, c, d and marginal totals (Fisher, 1954)

$$(a+b),\ (c+d),\ (a+c),\ (b+d) = \frac{(a+b)!*(c+d)!*(a+c)!*(b+d)!*}{n!*a!*b!*c!*d!}$$

Results and Discussion

Purpose of medicine usage

The results of the medicine usage pattern in the study area are presented in Table 1 and the same is depicted in Figure 1. The table shows that, 29 (48.34 per cent) farmers were using medicines mainly for therapeutic purpose in which 6 (20.69 per cent) were small farms, 12 (41.38 per cent) were medium farms and 11 (37.93 per cent) were large farms. Among the 60 farmers, 11 (18.33 per cent) were using medicines for prophylactic purpose in which 6 farmers were (54.55 per cent) medium, 4 farmers were large (36.36 per cent) and only one farmer (9.09 per cent) belonged to small farms. It was good to see that none of the selected commercial layer farmers were using medicines for growth promotion purpose. Thus it could be concluded that selected commercial layer farmers were giving antibiotics, only in case of disease incidence and none of them were using it for growth promotion purpose. Fisher exact analysis revealed no significant association between purpose of medicine usage and size of the farm. The findings of the study is in accordance with previous reports (Kabir *et al.*, 2004; Sirdar *et al.*, 2012; Carrique-Mas *et al.*, 2013; Boamah *et al.*, 2016 and Kamini *et al.*, 2016) where medicines were used for both therapeutic and prophylactic purposes. In contrast to the present study, Amaechi (2014) and Oluwasile *et al.*, (2014) reported that medicines were also used for growth promotion purposes.

Mode of medication

Drugs were administered mostly through drinking water (39 farms - 65.00 per cent) as it was the easiest route of administration for the farmers when compared to other modes of administration (Figure 2). The next preferred route was through feed (15 farms - 25.00 per cent) as some of the drugs will not dissolve completely in water which leads to blocking of nipple drinkers. Parenteral route of administration was preferred in only 10.00 per cent (6) of the farms as it was a laborious process.

In small farms, 4 (36.36 per cent) farmers administered drugs through feed and 7 (63.64 per cent) farmers administered drugs through water. In medium farms, among 27 farmers, only 1 (3.70 per cent) was using parenteral route, 5 (18.52 per cent) farmers administered through feed and 77.78 per cent of the (21) famers preferred administration through water. In large farms, 50.00 per cent (11) of the farmers preferred administration through water, 22.27 per cent (5) farmers preferred parenteral route and 27.73 per cent (6) preferred administration through feed. Fisher exact analysis revealed no significant association between mode of medication and size of the farm. Similarly Amaechi (2014) and Kamini *et al.*, (2016) also reported that most of the drugs were administered through drinking water.

Source of purchase

Most of the farmers (31) purchased their medicines from retail shops (51.67 per cent) as they were purchasing the medicine only during disease occurrence from the nearby shops. From the table it could be understood that, 48.33 per cent of the (29) farmers in the study area were purchasing directly from the distributor, mainly large farmers. As far as small farm is concerned, 63.64 per cent of the (7) farmers purchased medicines from retailer and 36.36 per cent of the (4) farmers purchased from distributor. It could be noted from the table that as the farm size increased, they were purchasing directly from distributors which might be due to the fact that large farms require more medicines that helps them to procure from distributors at low cost when compared to other category of farms. In case of large farmers, most of them (13) were purchasing medicines from distributor (59.09 per cent) and 40.91 per cent (9) were purchasing from retailer.

Table.1 Medicine usage pattern in the selected commercial layer farms of Namakkal district

(in numbers)

Variables	Particulars	Small farms	Medium farms	Large farms	Total farms
Purpose of Medicine usage	Therapeutic	6 (54.55)[a] (20.69)[b]	12 (44.45)[a] (41.38)[b]	11 (50.00)[a] (37.93)[b]	**29** **(48.34)[a]** **(100.00)[b]**
	Prophylactic	1 (9.09)[a] (9.09)[b]	6 (22.22)[a] (54.55)[b]	4 (18.18)[a] (36.36)[b]	**11** **(18.33)[a]** **(100.00)[b]**
	Therapeutic and Prophylactic	4 (36.36)[a] (20.00)[b]	9 (33.33)[a] (45.00)[b]	7 (31.82)[a] (35.00)[b]	**20** **(33.33)[a]** **(100.00)[b]**
	Growth Promotion	0	0	0	**0**
	Overall	**11** **(100.00)[a]** **(18.33)[b]**	**27** **(100.00)[a]** **(45.00)[b]**	**22** **(100.00)[a]** **(36.67)[b]**	**60** **(100.00)[a]** **(100.00)[b]**
					P value=0.950
Mode of Medication	Parenteral	0	1 (3.70)[a] (16.67)[b]	5 (22.27)[a] (83.33)[b]	**6** **(10.00)[a]** **(100.00)[b]**
	Through feed	4 (36.36)[a] (26.67)[b]	5 (18.52)[a] (33.33)[b]	6 (27.73)[a] (40.00)[b]	**15** **(25.00)[a]** **(100.00)[b]**
	Through water	7 (63.64)[a] (17.95)[b]	21 (77.78)[a] (53.84)[b]	11 (50.00)[a] (28.21)[b]	**39** **(65.00)[a]** **(100.00)[b]**
	Overall	**11** **(100.00)[a]** **(18.33)[b]**	**27** **(100.00)[a]** **(45.00)[b]**	**22** **(100.00)[a]** **(36.67)[b]**	**60** **(100.00)[a]** **(100.00)[b]**
					P value=0.113

a- Figures in the parentheses indicate column-wise percentages
b- Figures in the parentheses indicate row-wise percentages

Medicine usage pattern in the selected commercial layer farms of namakkal district

(in numbers)

Variables	Particulars	Small farms	Medium farms	Large farms	Total farms
Source of purchase	Distributor	4 (36.36)[a] (13.79)[b]	12 (44.44)[a] (41.38)[b]	13 (59.09)[a] (44.83)[b]	**29** **(48.33)[a]** **(100.00)[b]**
	Retailer	7 (63.64)[a] (22.58)[b]	15 (55.56)[a] (48.39)[b]	9 (40.91)[a] (29.03)[b]	**31** **(51.67)[a]** **(100.00)[b]**
	Overall	**11** **(100.00)[a]** **(18.33)[b]**	**27** **(100.00)[a]** **(45.00)[b]**	**22** **(100.00)[a]** **(36.67)[b]**	**60** **(100.00)[a]** **(100.00)[b]**
					P value=0.484
Source of Prescription	Veterinarian	7 (63.64)[a] (15.22)[b]	22 (81.48)[a] (47.83)[b]	17 (77.27)[a] (36.95)[b]	**46** **(76.67)[a]** **(100.00)[b]**
	Self	4 (36.36)[a] (28.58)[b]	5 (18.52)[a] (35.71)[b]	5 (22.73)[a] (35.71)[b]	**14** **(23.33)[a]** **(100.00)[b]**
	Overall	**11** **(100.00)[a]** **(18.33)[b]**	**27** **(100.00)[a]** **(45.00)[b]**	**22** **(100.00)[a]** **(36.67)[b]**	**60** **(100.00)[a]** **(100.00)[b]**
					P value=0.484
Time of use of Medicine	Morning	11 (100.00)[a] (18.33)[b]	27 (100.00)[a] (45.00)[b]	22 (100.00)[a] (36.67)[b]	**60** **(100.00)[a]** **(100.00)[b]**
	Evening	0	0	0	**0**
	Overall	**11** **(100.00)[a]** **(18.33)[b]**	**27** **(100.00)[a]** **(45.00)[b]**	**22** **(100.00)[a]** **(36.67)[b]**	**60** **(100.00)[a]** **(100.00)[b]**
					P value= 1.000

a- Figures in the parentheses indicate column-wise percentages

b- Figures in the parentheses indicate row-wise percentages

Fig.1 Purpose of medicine usage in the study area

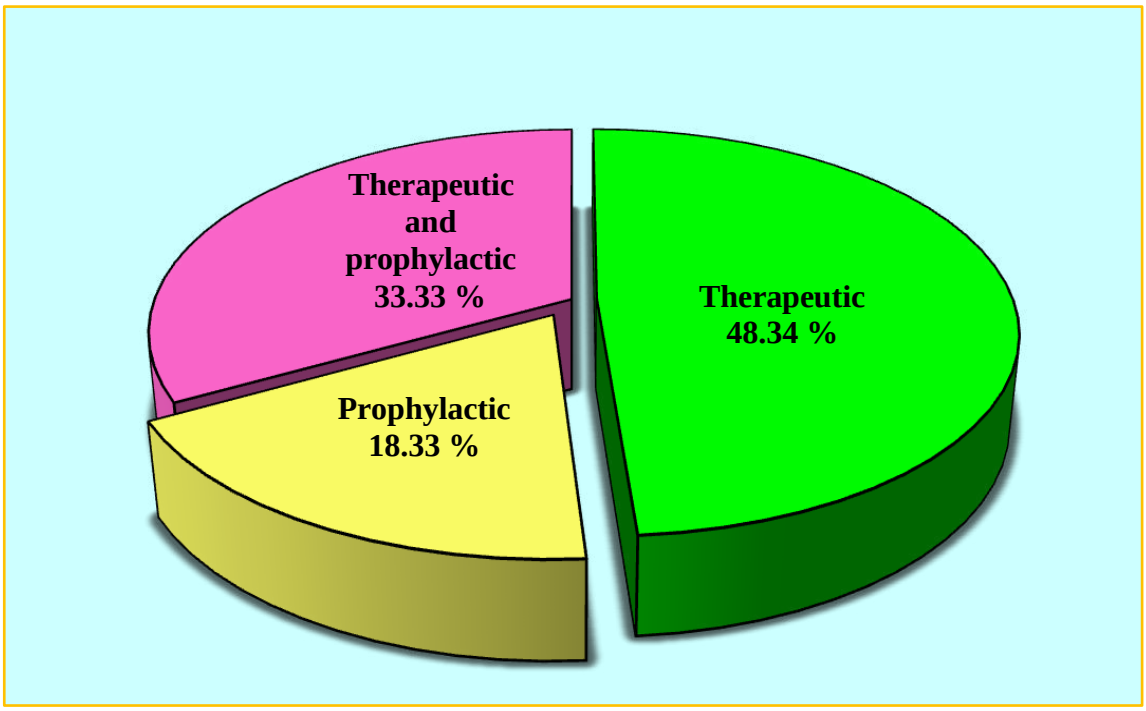
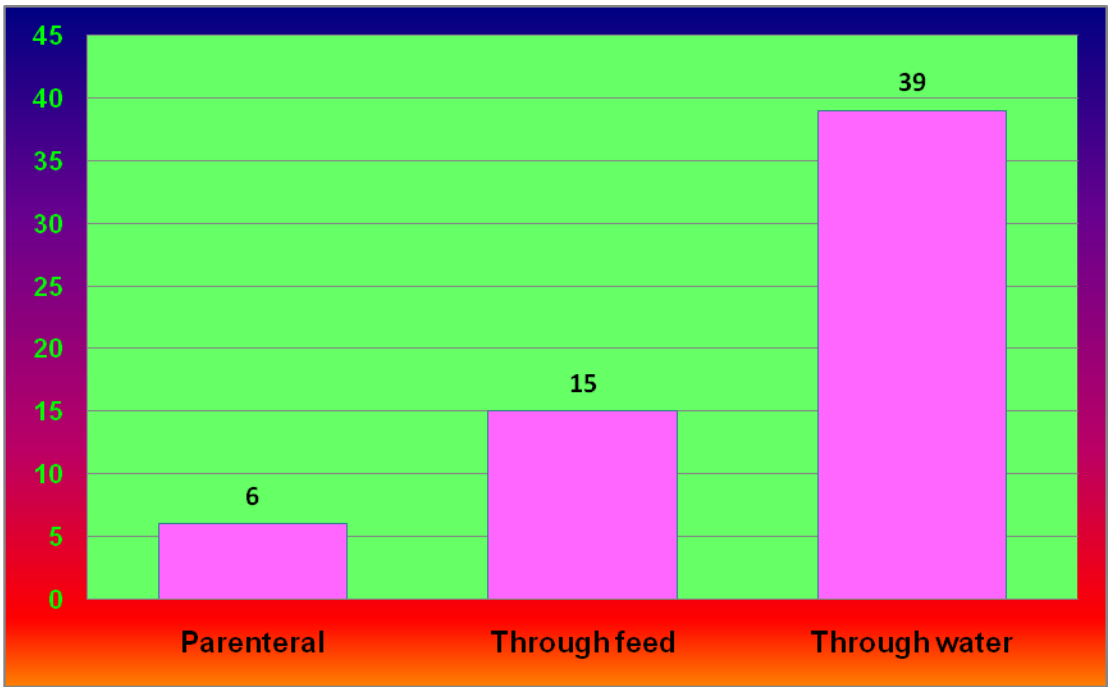


Fig.2 Mode of medication in the study area



Fisher exact analysis revealed source of medicine purchase is independent of farm size. Geidam *et al.*, (2012) in their study in Nigeria stated that all the selected farms (20 poultry farms) had purchased medicines from drug stores.

Source of prescription

Most of the farmers (46) purchased medicines based on veterinarian's prescription (76.67 per cent) and 23.33 per cent of the (14) farmers were using medicines on their

self-prescription. The farmers following the prescription from veterinarian were likely to be higher than self-medication in all categories of farms. 63.64 per cent of the (7) small farmers, 81.48 per cent of the (22) medium farmers and 77.27 per cent of the (17) large farmers were following veterinarian prescription. Fisher exact analysis revealed no significant association between source of prescription and size of the farm. Similar results were observed by Oluwasile *et al.,* (2014) who reported that 50 per cent of the farmers purchased medicines prescribed by veterinary doctor, 43.1 per cent of farmers were practicing self-medication and only 6.9 per cent of the medicines were prescribed by animal health workers. In contrast, Bashahun and Odoch, (2015) reported that the 30.0 per cent and 63.3 per cent of the farmers following the direction of veterinary doctors and para-veterinarians respectively.

Time of use of medicine

All the 60 farms were administering medicines at morning hours (100.00 per cent) and none of the farmers were administering the medicines in the evening hours. Fisher exact analysis showed that time of use of medicine is independent of size of the farm. 100 per cent of the farms were medicating the birds only in morning. This is due to the fact that the water intake will be more during morning hours after feed intake and in addition, it is easier for the farm manager to medicate the birds in morning and flush out the administered medicines from the pipeline and this is not possible when medicines are administered during evening hours, as the employers would be leaving for home.

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How to cite this article:

Divyabharathi S., M. Prabu, V. Senthilkumar, K. Rajendran, R. Chithra and Jeevitha M. 2018. Assessment of Therapeutic Medicine Usage Pattern in Commercial Poultry Layer Farms. *Int.J.Curr.Res.Aca.Rev.* 6(2), 75-82.
doi: https://doi.org/10.20546/ijcrar.2018.602.009