



Behaviour of laying hens subjected to noise induced fear

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Abstract

Scientific understanding about the behaviour of chicken subjected to fear is of importance not only to improve the productivity but also to optimize the welfare standards. The objective of the study was to investigate the effect fear, induced by sound on the behaviour of reared laying hens. Six White Leghorn layer birds were randomly selected from each of the 3 flocks in three cages. Behaviour of the selected birds of a one cage under un-feared condition was recorded in the first day. Next day birds in the same cage were feared by ringing a bell four times in 15 minutes intervals. Immediately after ringing the bell, recording of the behaviour of the selected six birds were commenced and continued for an hour. One trained person was assigned to each of the bird to make the behavioural recordings under both conditions. Two more similar observation cycles were done for the birds in other two cages in subsequent days. The comparison of the behaviour showed that the time spent on walking and litter eating and their frequencies were significantly reduced when birds were feared. Meanwhile, the time and the frequency of lying were significantly higher among feared birds. Interestingly, time spent on behaviours which had not been predefined in the ethogram was significantly higher in feared birds and that behaviour (other) was the most prominent behavior of those birds. The time spent on behaviours such as eating, drinking, sitting, standing, running and inter bird interactions were not significantly different between the treatments. The times spent on behaviours such as standing, eating, litter eating, drinking and undefined behaviours of feared birds during first five minutes after being feared were significantly different from that of normal birds. It was concluded that noise-induced-fear significantly alters the behaviour and evokes behaviours similar to tonic immobility in laying hens.

Key words: fear, behavior, sound, layer, poultry

Introduction

Fear is a state of suffering in domestic fowl (Duncan, 1998). Freedom from fear and distress has universally been recognized as one of the five essential aspects that have to be considered in order to optimize the welfare standards of livestock. Behaviour has been identified as the best indicator of animal welfare. Also, certain behaviors patterns are very strongly motivated and, if they are not allowed expression, the birds welfare is jeopardized (Duncan, 1998).

Fear responses of poultry range from slight alerting and avoidance to extreme panic. Effects of various factors such as environment, individuality, novelty, genetic make up (including strain and gender), age, human-bird interaction, handling and transport, maturation and experience on fear responses of poultry have been reported by several authors (Rose et al., 1985; Campo et al., 2001; Andrews et al., 1997; Ghareeb et al. 2008).

Disturbing noises increased the incidence of blood spots in eggs (Stiles and Dawson, 1961). Nonspecific sounds stimulated the nonphotostimulated gonadal growth in quail (Li and Burke, 1987). Tapping sounds

to mimic pecks to the feeder increased the feeding behaviour. Hester (2005) mentioned that little information was available on the effects of environmental noises or sound on bird well-being. The objective of the study was to investigate the effect of noise induced fear on the behaviour of laying hens.

Materials and Methods:

This experiment was conducted at the research farm of the Faculty of Agriculture, University of Ruhuna. Six White Leghorn layer birds were randomly selected from each of the 3 flocks in three cages (a total of 18 layers). For easy identification in obtaining observation and data recording, selected birds were marked using ink in different colors. Behaviour of each bird was done under feared or un-feared condition. One trained person was assigned to each of the bird to make the behavioural recordings under both conditions. The time spent on 16 predefined behaviours (Table 1) and their frequencies were recorded for a period of one hour. Same persons were assigned taking observations of each bird through out the experimental period. Behaviour of the selected

birds of a one cage under un-feared condition was recorded in the first day. Next day birds in the same cage were feared by ringing a bell four times in 15 minutes intervals (at 0, 15, 30 and 45 minute). Immediately after ringing the bell, recording of the behaviour of selected six birds were commenced. Two more similar observation cycles were done for the birds in other two cages in subsequent days. The behaviour observations were taken in the afternoon hours from 1700 to 1800 hrs.

Ethogram used to identify the different behaviours is given in Table 1.

Table 1. Ethogram used for the behavioural study

Behaviour	Description
Standing	Standing with no apparent movement of legs.
Sitting	Sitting with body in contact with litter
Walking	Taking one or more steps.
Eating	Head extended towards the feeder and appears to be manipulating or ingesting feed.
Drinking	Beak in contact with drinker and appears to be ingesting water.
Running	Taking one or more steps quickly.
Lying	Sitting with body in contact with the wooden nest box.
Preening	Self manipulation of own feathers with beak.
Head flicking	Body immobile apart from rapid head movements in any direction or rotations of the head around its vertical, horizontal axis.
Beak wiping	Beak related behaviours.
Wing flapping	Extension and flapping of wings.
Body shaking Vocalization	Raised feathers and shake body. Shouting or making any kind of sound.
Dust bathing	Sitting on substrate scratching and bill racking.
Litter eating	Beak in contact with the litter and appears to be ingesting litter.
Bird Interaction	Interact or communicate with other birds using beak.
Other	Except above behaviours all other behaviours such as sleeping, floor scratching, jumping and flying.

Results and Discussion

Time budget of the layer chicken to fear are shown in Table 2.

The prominent activity of the birds who were not subjected to fear was litter eating while in feared birds the most prominent activity was other activities which had not been defined in the echogram. The times spend on walking and litter eating and frequencies of those activities were significantly reduced when layers were feared by noise (Table 2 and 3). Feared birds spent more time on lying and other activities which had not been defined in the ethogram. Feared birds show protracted voluntary lying or extended freezing called tonic immobility which is characterized by an abnormally low level of reactivity (Fraser and Broom, 2001). Several authors (Gallup, 1979; Marin et al., 2001; Hocking et al., 2001; Albentosa et al., 2003) have used the duration of tonic immobility as an indirect measure of fearfulness in poultry. Tonic immobility times of manually handled poultry could be as high as 7.5 min (Ghareeb et al., 2008), 5.2 min (Campo et al., 2001) and 3.2 min (Andrews et al., 1997). Though the feared birds were less active and spent more time on lying than un-feared birds during the first five minutes after being feared the lying time of feared birds was not significantly different from un-feared birds. Though we did not determine the tonic immobility, it was observed that right after ringing the bell, birds showed unresponsive gazing behaviour similar to tonic immobility. However, the duration of such behaviours were not lasted for minutes as reported by others (Ghareeb et al., 2008; Campo et al., 2001 and Andrews et al., 1997) with manual handling. Results of this study suggest that layers show behaviours similar to tonic immobility even when they were feared by a noxious noise.

Feared birds spent significantly more time on behaviors which had not been specified in the ethogram (other behaviors). It seems that fear might have disturbed the birds behaviour leading to many unusual behaviours. Interaction with litter is an important behaviour of layers. Litter provides a substrate for interaction and is a good source of vitamin B for poultry. Fear significantly reduced the frequency and time on litter interaction. This suggests that noise induced fear, apart from inducing tonic immobility and inactive behaviors has other negative welfare and nutritional implications by reducing interactions with litter.

The times and frequencies of feeding drinking, running, preening, head flicking, beak whipping, wing flapping, body shaking, vocalization and birds interaction were not affected by fear.

Table 2. Time budget of un-feared or feared laying hens

Behaviour	Treatment				p
	Normal		Feared		
	Duration seconds (Per hour)	% time	Duration seconds (Per hour)	% time	
Standing	95.00	2.660	111.67	3.12	0.655
Sitting	358.3	10.03	288.9	8.08	0.736
Walking	783.3	21.93	500.8	14.02	0.054
Eating	343.3	9.610	205.0	5.74	0.210
Drinking	110.83	3.100	76.67	2.14	0.258
Running	20.00	0.56	17.50	0.49	0.794
Lying	539.2	15.09	1306.7	36.58	0.043
Preening	305.8	8.56	186.7	5.22	0.181
Head Flicking	735.8	20.60	545.0	15.26	0.311
Beak Whipping	52.50	1.47	28.33	0.79	0.432
Wing Flapping	27.50	0.77	17.50	0.49	0.319
Body Shaking	6.667	0.186	1.667	0.046	0.181
Vocalization	11.67	0.32	95.0	2.66	0.219
Dust Bathing	0.00	0.00	0.00	0.00	0.000
Litter Eating	920.0	25.76	250.0	7.00	0.000
Bird Interaction	91.67	2.56	51.72	1.44	0.180
Other	467.5	13.09	1447.5	40.53	0.009

Comparison of the behavior during the first five minutes right after the fearing of layers with that of the un-feared birds during the same period showed interesting features (Table 4). During the first five minutes following the fear, there was no significant difference in walking and lying times of the feared and un-feared birds. However, when averaged for the whole one hour period, walking time reduced and lying time increased due to fear. This suggests that effects of fear on walking and lying have induced some time after the induction of fear. Similarly, when whole one

hour was considered, eating and drinking time were not altered due to fear. However, during first five minutes after the fearing, both feeding and drinking time significantly reduced. It seems that the feeding and drinking time lost in feared birds during the first five minutes after being feared has compensated later. Effects of fear on litter eating/interaction and other activities have initiated right after the fear induction. It was concluded that noise-induced-fear significantly alters the behaviour and evokes behaviours similar to tonic immobility in laying hens.

Table 3. Frequencies of different behaviours of un-feared or feared laying hens

Behaviour	Treatment		SEM	P
	Normal	Feared		
Standing	22.67	14.22	2.607	0.028
Sitting	2.889	3.056	1.065	0.913
Walking	26.83	14.89	2.612	0.003
Eating	6.389	4.222	1.124	0.182
Drinking	4.833	2.889	0.8785	0.127
Running	1.389	1.056	0.4225	0.581
Lying	2.889	5.944	0.9434	0.028
Preening	7.222	4.722	1.661	0.210
Head Flicking	25.94	16.83	3.562	0.079
Beak Whipping	2.722	1.500	1.088	0.432
Wing Flapping	1.944	1.111	0.4478	0.197
Body Shaking	0.3333	0.1111	0.1387	0.265
Vocalization	1.000	1.333	0.5913	0.693
Dust Bathing	0.000	0.000	0.000	0.000
Litter Eating	16.278	6.222	1.585	0.000
Bird Interaction	3.944	2.889	0.7677	0.338
Other	6.389	7.278	1.407	0.658



Comparison of the behavior during the first five minutes right after the fearing of layers with that of the un-feared birds during the same period showed interesting features (Table 4). During the first five minutes following the fear,

Behaviour	Time after fear induction	Normal (%)	Feared (%)	p	SEM
Standing		14.5825	18.75	0.338	0.202667
	61 – 120	7.2925	2.485	0.082	0.165667
	121 – 180	4.1675	10.4175	0.059	0.151833
	181 – 240	5.2075	12.5	0.073	0.187333
	241 - 300	2.0825	13.54	0	0.14
Sitting	0 – 60	5.2075	4.1675	0.719	0.135333
	61 – 120	5.2075	5.2075	1	0.141
	121 – 180	6.25	7.2925	0.752	0.154167
	181 – 240	5.2075	6.25	0.738	0.145833
	241 - 300	4.1675	5.2075	0.719	0.135333
Walking	0 – 60	5.2075	5.2075	1	0.141
	61 – 120	8.3325	8.3325	1	0.216667
	121 – 180	5.2075	4.1675	0.75	0.152833
	181 – 240	5.2075	4.1675	0.719	0.135333
	241 - 300	10.4175	8.3325	0.719	0.270833
Eating	0 – 60	17.7075	0	0	0.132167
	61 – 120	17.7075	1.04	0	0.158
	121 – 180	16.665	0.823	0	0.167667
	181 – 240	14.5825	2.0825	0	0.171333
	241 - 300	14.5825	3.125	0.007	0.190667
Drinking	0 – 60	5.2075	1.04	0.084	0.111167
	61 – 120	3.125	0	0.076	0.111167
	121 – 180	5.2075	0	0.018	0.081167
	181 – 240	2.0825	1.04	0.561	0.099667
	241 - 300	0.52	1.04	0.084	0.083667
Lying	0 – 60	3.125	6.25	0.277	0.133833
	61 – 120	3.125	4.1675	0.69	0.122333
	121 – 180	3.125	5.2	0.449	0.128667
	181 – 240	3.125	6.25	0.336	0.1515
	241 - 300	3.125	5.2	0.449	0.128667
Preening	0 – 60	2.0825	2.0825	1	0.096
	61 – 120	2.0825	4.1675	0.394	0.114
	121 – 180	1.04	3.125	0.306	0.094833
	181 – 240	2.0825	6.25	0.182	0.144667
	241 - 300	2.0825	2.0825	1	0.096
Head flick	0 – 60	5.2075	18.75	0.002	0.190667
	61 – 120	4.1675	16.6675	0.004	0.192167
	121 – 180	5.2075	12.5	0.113	0.2125
	181 – 240	5.2075	12.5	0.132	0.224167
	241 - 300	3.125	8.3325	0.197	0.187333
Beak whip	0 – 60	0	0	0	0
	61 – 120	0	0	0	0
	121 – 180	0	0	0	0
	181 – 240	0	0	0	0
	241 - 300	0	0	0	0
Wing flap	0 – 60	1.04	1.04	1	0.069333
	61 – 120	0	0	0	0
	121 – 180	2.0825	1.04	0.561	0.083667
	181 – 240	1.04	1.04	1	0.069333
	241 - 300	2.0825	1.04	0.561	0.083667
Body shake	0 – 60	0	0	0	0
	61 – 120	0	0	0	0
	121 – 180	0	0	0	0
	181 – 240	0	0	0	0
	241 - 300	0	0	0	0

vocalization	0 – 60	0	3.125	0.076	0.081167
	61 – 120	0	0	0	0
	121 – 180	0	0	0	0
	181 – 240	0	0	0	0
	241 – 300	0	0	0	0
Dust bathe	0 – 60	0	0	0	0
	61 – 120	0	0	0	0
	121 – 180	0	0	0	0
	181 – 240	0	0	0	0
	241 – 300	0	0	0	0
Litter eating	0 – 60	9.375	2.0825	0.031	0.154167
	61 – 120	8.3325	2.0825	0.059	0.151833
	121 – 180	10.4175	4.1675	0.138	0.195333
	181 – 240	9.375	2.0825	0.049	0.169833
	241 – 300	4.1675	10.4175	0.248	0.125667
Bird interact	0 – 60	7.29	1.04	0.02	0.162167
	61 – 120	3.125	4.1675	0.69	0.153167
	121 – 180	3.125	2.0825	0.738	0.168833
	181 – 240	0	0	0	0.146833
	241 – 300	1.04	1.04	1	0.1635
other	0 – 60	6.25	13.5425	0.04	0.162167
	61 – 120	4.1675	12.5	0.014	0.153167
	121 – 180	4.1675	12.5	0.024	0.168833
	181 – 240	3.125	11.4575	0.01	0.146833
	241 – 300	3.125	12.5	0.01	0.1635

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