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HABITUATION TO HUMAN BEINGS VIA VISUAL CONTACT IN DOCILE AND FLIGHTY STRAINS OF DOMESTIC CHICKS

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ABSTRACT: The present study examined the effects of two treatments on the approach / avoidance responses of pair-housed female domestic chicks of a Ross broiler and two laying strains (one docile ISA Brown medium hybrid, one flighty White Leghorn light hybrid) to a visible experimenter. Chicks in the visual contact (VC) group were allowed to see the experimenter for 30 s twice a day from 1 day of age until testing at 10 or 11 days whereas controls (CON) received minimal human exposure throughout the study. Apart from the visible presence of the experimenter, treatment procedures were similar for the two groups. All chicks were tested individually but pair means were used as data points. Chicks of all three strains which had received the VC treatment showed considerably lower avoidance of humans than did their CON counterparts. The present results demonstrate that fear of humans was markedly reduced by a simple regime of close visual contact with the experimenter, presumably through habituation, and that this effect was common to chicks of flighty as well as docile strains. These findings are discussed in terms of their implications for resource management in the laboratory and on the farm.

INTRODUCTION

Fear of human beings and its reduction through some method of habituation have important implications for the housing and husbandry of domestic chicks in the laboratory and on the farm. Firstly, the outcome of experiments may be influenced by differences across or within laboratories in the degree and/or nature of animal-human contact and, thereby, in the likelihood that habituation to people might occur. For instance, it was shown that differences between genetic lines of chickens in their immune responses to challenge were accentuated in those chicks which had been habituated to the

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experimenters through a regime of regular handling (Gross & Siegel, 1979). It has also been suggested that the socialization (sic) or habituation of domestic chicks to humans might compromise the ecological validity of experimental studies in which the birds are reared in isolation (Eddy & Gallup, 1994). Secondly, intense or persistent fear of human beings can severely harm the welfare, management and performance of poultry. Indeed, heightened fear of humans has been associated with numerous adverse effects in layer and in meat-type broiler chickens. These include i) increased risk of injury, pain, and death caused by inappropriate fear responses, such as panic and violent escape, ii) greater feather loss and the consequent increases in heat loss and in susceptibility to injury, iii) increased aggressiveness, and iv) reductions in growth, food conversion efficiency, egg production and eggshell quality with the associated economic loss (Barnett, Hemsworth, & Newman, 1992; Craig, Craig, & Dayton, 1983; Hemsworth & Barnett 1989; Jones 1989; 1995; Jones, Hemsworth, & Barnett, 1993; Jones & Hughes, 1986; Komai & Guhl, 1960; Mills & Faure, 1990).

The domestic chick's fear of humans can be reliably and powerfully reduced through a regime of regular gentle handling, presumably through a process of habituation (Gilman, Marcuse, & Moore, 1950; Jones & Faure, 1981; Jones & Waddington, 1992, 1993). Chicks habituated to one particular handler also showed reduced fear of other quite dissimilar people, regardless of variations in their gender or in the colour and style of their clothing (Jones, 1994). This treatment also facilitated later capture and handling (Gross & Siegel, 1982), decreased aggressiveness within the flock (Collins & Siegel, 1987), and improved FCE and growth in young broiler and layer chicks (Gross & Siegel, 1982; Jones & Hughes, 1981; Thompson 1976). However, the regular handling procedure traditionally involves picking the chick up for brief periods, stroking it gently, talking to it and perhaps offering it food and, despite their clear potential benefits, it would simply not be feasible to apply such handling regimes in today's huge commercial flocks. Encouragingly though, a recent study demonstrated that fear and avoidance of humans was reduced in pair-housed chicks of a medium hybrid layer strain (ISA Brown) simply by allowing them to see the experimenter for 30 s twice daily (Jones, 1993); in fact, this "visual contact" procedure was even more effective than a regime of gentle handling. Similarly, Eddy and Gallup (1994) found that passive socialization to human beings developed solely through regular visual contact reduced subsequent fear of people in individually-housed Production-Red

chicks. These observations are important because effective modification of the human / chicken relationship through mere visual contact with people might have practical relevance.

Pronounced strain differences in the chicken's behavioural and physiological responsiveness to human beings have been reported, with light-hybrid White Leghorns generally showing substantially greater fear and avoidance than medium hybrid birds (Gallup, Ledbetter, & Maser, 1976; Jones, Hughes, & Duncan, 1981; Jones & Mills, 1983; Murphy & Duncan, 1977). Similarly, despite the absence of objective evidence, meat-type broiler chickens are commonly considered to be more docile than light- or medium-hybrid layers (Siegel, 1983; Appleby, Hughes, & Elson, 1992). Before we can properly assess the overall applicability of the visual contact (VC) procedure, we must ask whether its effects will generalize across chickens of a number of strains which differ in their presumed levels of flightiness / placidity. Therefore, the present study compared the degree of avoidance of the experimenter shown by individually-tested, pair-housed chicks of a medium hybrid ISA Brown, a light hybrid White Leghorn, and a Ross broiler strain which had either received regular visual contact with the experimenter or minimal exposure to people.

Fear responses in the domestic chick are thought to increase in frequency and intensity from very low levels on day 1, through a series of peaks and troughs, to high levels by 9 or 10 days of age when overall bias to right hemisphere control develops (Salzen, 1979; Andrew & Brennan, 1983; 1984). Therefore, all the chicks were tested at 10 or 11 days in the present study in order to avoid the potentially confounding effects of these early fluctuations in fear.

Ideally, fear is an adaptive emotional response to perceived danger with fear behaviour, such as withdrawal, functioning to protect the animal from injury (Jones, 1987; Toates, 1980). Consequently, it has been proposed that the degree of avoidance of a stimulus is a useful measure of the animal's fear of it (Hemsworth, Barnett, & Coleman, 1993). Therefore, fear of humans was functionally measured here in terms of the chicks' approach / avoidance responses to a visible experimenter in a standard test situation, under the assumption that the degree of avoidance would be positively related to the chicks' fear of humans. Indeed, avoidance scores recorded in a similar 'Box plus Experimenter' test are known to be reduced by regular handling and to be significantly correlated with fear scores assigned in other tests (Jones & Waddington, 1992; Jones, 1993).

METHOD

Animals, housing and treatments

Three single-strain batches of one-day-old female chicks were obtained at intervals of two weeks. It was only possible to house and test one strain at a time. These batches comprised firstly, 80 ISA Brown (a medium-hybrid strain originally derived from a Rhode Island White x Rhode Island Red cross), secondly, 80 Ross broiler and, thirdly, 72 White Leghorn chicks. The ISA Brown and Ross chicks were purchased from commercial suppliers whereas the White Leghorns were obtained from a flock maintained on site. Upon receipt, the chicks were housed in pairs in wooden boxes divided into two compartments each measuring 38 x 33 x 30 cm (length x breadth x height). The boxes rested on 1 m high wooden shelves and their wire-mesh floors were raised 2 cm off the shelving in order to allow passage of excreta. One wall of each compartment consisted of wire mesh whereas the other three walls were constructed of wood. Hardboard covers were placed over the wire walls. These were attached with velcro and they were only removed during treatment. Thus, the covers effectively precluded viewing of the external environment at all times other than during treatment. Wire mesh lids prevented the chicks from jumping out. Food (chick starter mash) and water were provided ad libitum in semi-circular plastic hoppers which were attached to grids suspended from the tops of the compartment walls. These could be removed and replaced remotely for maintenance purposes without permitting the chicks to see the attendant. An ambient temperature of approximately 29°C was maintained by a combination of convector and dull emitter heaters. The photoperiod ran from 0500 to 1900 h.

Each pair of chicks was assigned at random to one of two treatments and both treatments were represented in each box. Treatments were applied to only one pair of chicks, i.e., one compartment, at a time. Chicks from the minimal exposure or control (CON) treatment group received no deliberate visual or physical contact with human beings other than that incurred during initial placement in the home cage and upon their removal at test. The hardboard covers were removed from the wire-mesh wall of their home compartment twice a day for 30 s but the experimenter stood to one side and out of the birds' sight. Thus CON chicks could only see the dun coloured wall and the wooden walls of the boxes situated

directly across the aisle during treatment. Conversely, when the hardboard cover was removed, the experimenter stood directly in front of and gently stroked the wire-mesh wall of the home compartment of each pair of chicks in the VC group for 30 s twice daily. The experimenter stooped during this procedure so that his face was level with and approximately 25 cm away from the wire wall. The experimenter's eye movements and direction of gaze were random apart from the proviso that, since eyes and eye shapes are aversive to young chicks (Jones, 1980), he avoided staring at the birds for periods longer than 2 or 3 s. The chicks remained otherwise undisturbed until their responses in the Box plus Experimenter test were recorded at 10 or 11 days of age.

Box plus experimenter test

Each member of each pair of chicks was tested individually and once only. It was removed from its home box and carried approximately 5 m by hand to a separate room where it was placed in a rectangular box (62 x 40 x 30 cm) with three wooden walls and one of 1.5 cm wire mesh. A wire mesh lid prevented escape and the floor was covered with wood shavings. Placement of the chick in the test box was constant, it always straddled zones 2 and 3 (see below) and faced the wire-mesh wall. The experimenter remained clearly visible to the chick throughout the test. He sat directly in front of and facing the wire-mesh wall so that his head and torso were level with and approximately 30 cm away from the front of the test box. He remained silent and still, apart from those movements required to record the chick's responses, during the test. The box was divided by imaginary lines into four zones (15 x 40 cm) and the chick's position was recorded every 15 s over the 4 min test period. It scored 1 if it was in the zone closest to the experimenter and the score progressed through 2 and 3 to 4 at the far end. The total avoidance score recorded by each chick was the sum of 16 scans (minimum score = 16, maximum = 64) and high scores reflected high avoidance / fear. All chicks were tested by the same experimenter. Droppings were removed after each trial and the wood shavings were changed at regular intervals.

One member of each pair of chicks was tested at 10 days of age whereas their companions were tested when they were 11 days old. The order of testing was randomized within these blocks. The 24 h interval allowed between testing the members of each pair was considered likely to minimize any separation distress which may have

been induced by the temporary removal of the first chick (Jones & Williams, 1992). Twenty VC and 20 CON pairs of ISA Brown chicks were tested in the first experiment, 20 VC and 20 CON pairs of broilers in the second, and 18 VC and 18 CON pairs of White Leghorns in the third.

Statistical analyses

The avoidance scores recorded for each member of a pair were summed and then halved to give a single value for each pair. The resultant pair means were then used as data points throughout the study. The avoidance scores of VC and CON chicks were compared within strains using the Mann-Whitney U test (two-tailed). The intervals between receipt of chicks of each of the three strains and the differences in the nature and duration of transit between hatch and receipt precluded direct comparisons of strain effects.

RESULTS

Chicks of each of the ISA Brown, broiler, and White Leghorn strains which had received regular visual contact with the experimenter (VC) showed considerably less avoidance of the experimenter at test than did those from the corresponding minimal exposure control (CON) groups (Table 1).

Table 1. Avoidance scores in the Box plus Experimenter test of chicks of an ISA Brown medium hybrid, a broiler, and a White Leghorn light hybrid strain which had received either minimal exposure to human beings (CON) or regular visual contact (VC) with the experimenter, (means and their standard errors).

Strain	Treatment groups		Test statistic	*p*
	VC	CON		
Isa Brown (n = 20)	24.6 + 0.8	41.9 + 1.4	z = 5.55	< 0.0000
Broiler (n = 20)	26.4 + 1.3	45.2 + 1.4	z = 5.53	< 0.0000
White Leghorn (n = 18)	46.3 + 0.6	59.2 + 1.2	U = 11.50	< 0.002

DISCUSSION

The present findings confirmed previous observations that fear of human beings was considerably reduced in pair-housed (Jones, 1993) and individually-reared (Eddy & Gallup, 1994) medium-hybrid chicks simply by allowing them to see the experimenter for brief periods on a regular basis. Furthermore, the avoidance scores of the VC medium-hybrid ISA Browns recorded here (24.6) were remarkably similar to those (24.4) obtained in an earlier study (Jones, 1993). The present findings also demonstrated that the fear-reducing effects of this visual contact treatment generalized to include broiler chicks, which are commonly regarded, rightly or wrongly, as docile birds (Siegel, 1983; Appleby, Hughes & Elson, 1992), as well as those of a "flighty" White Leghorn laying strain. Collectively, these findings further attest to the flexibility of the handling phenomenon and they are considered likely to have important implications for the management of domestic chicks in the laboratory and on the farm.

For example, regardless of the behavioural concept or variable under investigation, a high proportion of laboratory test situations involve at least some contact between the animal and the experimenter. In view of the present findings, I would make two recommendations. Firstly, the amount and nature of human contact experienced by the test animal during routine husbandry should always be specified. Secondly, unless habituation to humans *per se* is under investigation, there should be uniformity of human-animal contact within studies. Furthermore, because fear competes with and inhibits behaviours generated by all other motivational systems (Gray, 1987; Jones, 1987), a simple regime of habituation to humans could reduce the likelihood that fear of the experimenter might interfere with the animal's performance at test. In this context, it is interesting to note that rats and mice which had received additional stimulation, including handling, in infancy showed superior learning later in life (Denenberg, 1962).

Although chicks kept in practice are likely to receive some visual contact with the farmer, the present findings also suggest that more frequent examination of the birds by the stockperson could not only improve monitoring of flock health and systems operation but that it could further facilitate habituation to humans and thereby help to reduce the chickens' fear of people. This proposal is entirely consistent with a recent recommendation made by the U.K.'s Farm Animal Welfare Council (1992) that stockpersons should systematically inspect their flocks for sick or dead birds twice a day

and that they should walk within approximately 3 metres of every bird. Furthermore, anecdotal reports suggested that flightiness was reduced and that harvesting of broilers was facilitated at certain commercial concerns in New Zealand if the stockpersons had walked regularly and noisily through the poultry sheds (Jones, 1985; 1989). Because, the stockpersons' behaviour and attitude towards the animals in their care can profoundly affect responsiveness to humans as well as performance in pigs and poultry (Hemsworth, Coleman, & Barnett, 1994; Jones 1992), these potentially influential variables must also be taken into account in any programme designed to modify fear of humans. Indeed, the nature of those human behaviours most likely to reduce fear on farm needs to be determined.

The chicks' reduced fear of humans elicited by regular physical handling persisted for at least 12 days after cessation of treatment (Jones & Waddington, 1993) but it is not yet known how durable the effects of the visual contact treatment might be. Neither has it been determined whether or not a regime of VC treatment would reduce the aversive properties of actual physical contact with humans, such as that encountered during capture and placement in a laboratory apparatus, manual harvesting of commercial broilers prior to slaughter, and cage depopulation of spent laying hens. Encouragingly though, a previous study showed that VC was accompanied by a numerical, albeit non-significant, reduction in the duration of chicks' tonic immobility fear reactions to manual restraint (Jones, 1993). Similarly, chicks whose primary source of visual stimulation during rearing was in the form of human caretakers also showed significantly shorter durations of tonic immobility than did those which had received no such visual contact with people (Eddy & Gallup, 1994).

Although the use of different batches precluded direct line comparisons, the present findings that avoidance scores were numerically greater in White Leghorns than in ISA Brown chicks (collective means = 52.75 versus 33.25) are consistent with previous reports of greater flightiness in White Leghorns than in medium-hybrid brown birds (Jones & Mills, 1983; Murphy & Duncan, 1977).

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