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Does Access to Open Water Affect the Behaviour of Pekin Ducks (*Anas platyrhynos)*?

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ABSTRACT

Ducks show a wide range of water-related behaviours but commercial production often involves access to water that allows drinking only. In this study we evaluated effects of four water resource (WR) treatments on water related behaviours of Pekin ducks. Ducks (n = 2800) were kept in one of four water provision treatments (7 replicate groups of 100 ducks per treatment) from 20 days of age: a bath that allowed full access to water; a trough in which the head could be dipped but without body access; turkey bell drinkers; chicken bell drinkers. The turkey and chicken bells provided easy access for drinking but less oppor- tunity for interaction with the water. The behaviour of the ducks was video recorded, then analysed using scan sampling at 7.5 min intervals between 10:00 and 22:00 at 21, 32, 42 and 45 days. As might be expected, as birds grew, fewer were observed in the bath and over all treatments the amount of preening behaviour increased as ducks aged. Although ducks with access to a bath spent less time in or near the bath, this does not indicate lack of importance to the birds. Fewer ducks were observed standing or resting idle at the bath, and they per- formed proportionately more water-related preening behaviours than ducks in the other treatments. Moreover, as access to water increased (i.e. from beak only, through to entire body access) higher proportion of preening ducks performed head-dipping behaviour, and a lower proportion performed feather manipulation. This work shows that provision of a water resource that permits full body access appears to promote efficiency of drinking- related behaviours and preening behaviour. This helps to explain improvements in feather hygiene reported in other studies where the birds had full access to, or greater access to water.

INTRODUCTION

The species of duck most commonly used for meat production in the UK is the domesticated mallard duck, *Anas platyrhynchos*. The UK market for duck meat has grown steadily during the past 15 years (SAC, 2009), and there has been a concurrent increase in interest in, and research into, how best to manage ducks with regard to their welfare. The level of access to open water, and consequent ability of the duck to perform water-related behaviours, can affect duck welfare in several ways. There is growing evidence that access to open water improves duck health; an increasing level of access to water is associated with improved feather hygiene, better eye health, and a reduction in dirty and blocked nostrils (Knierim et al., 2004, Jones et al., 2009, O'Driscoll and Broom, 2011;). Moreover, access to open water is necessary for many of the behaviours that form part of the ducks normal behavioural repertoire, and their very performance may be important to the duck

Ducks use water when performing preening behaviour, and increased access to water corresponds to a concurrent increase in feather hygiene (Jones et al., 2009, O'Driscoll et al., 2011). Jones et al. (2009) found that ducks spend equal amounts of time bathing at a shower, trough, and bath, but much less time bathing at nipple drinkers which provide more restricted access to water. They concluded that the former three resources were equivalent with regard to provision of water. In that study there was a similar incidence of ducks with clean smooth feathers in the former three treatments, but a lower incidence in ducks with access to nipples, correlating to the time spent bathing at each resource.

However, it is unknown whether it is the presence of open water in itself or contact between water and the duck's bill or feathers that stimulates preening behaviour, or simply that the effectiveness of preening is improved when performed in conjunction with water. O'Driscoll et al. (2011) found that feather hygiene scores were lowest in ducks with access to a chicken bell drinker (beak access), higher in ducks with access to a narrow trough (head and beak access), and highest in ducks with access to a bath (whole body access). Ducks in that study were managed in groups of 100 ducks, whereas in the study by Jones et al. (2009) there were only 4 ducks per group. It is possible that differences in competition levels for access to different types of water resource differentially impacts time spent performing bathing behaviours at each resource, and as a consequence, feather hygiene scores. Alternatively, the more detailed hygiene scoring system used by O'Driscoll et al. (2011) could have been more precise in detecting differences in hygiene between the treatments compared with that of Jones et al. (2009). Thus the differences could be indicative of an improvement in the effectiveness of bathing behaviour, regardless of time spent bathing.

Ducks have a clear preference for water resources that provide a greater level of access to open water; they prefer a bell drinker to a nipple drinker, and paid a higher price for access to a trough than bell or nipple drinkers, and lowest for nipple (Cooper et al., 2002). Moreover, only ducks reared with access to nipple drinkers showed compensatory rebound when subsequently provided with access to a bath, compared with ducks that previously had access to open water (Jones et al., 2009). Thus access to water where a wide range of water-directed behaviours can be performed appears to be important to ducks. Waitt et al. (2009) found that ducks with access to a bath performed a wider and more unpredictable sequence of bathing-related behaviours than ducks with access to nipples, a trough or a shower. However, bathing bout duration for birds with access to the bath was shorter than of those with access to the trough and shower. Thus it is not simply an increase in access to water that increases the duration of bathing behaviour. Other factors, such as the potential to perform components of the bathing sequence, could also affect it.

However, provision of open water that ducks can enter to perform preening behaviour could have negative consequences for duck health. Open water can have high bacterial counts due to ducks defecating in the water (Kuhnt et al., 2004). There is also an economic cost associated with dirty water because of the labour required to clean the receptacles, and the cost of treatment and disposal of the water. Thus a method of providing open water that reduces any risk to health, and that reduces the volume of water used, should be investigated.

In this study we investigated the effect of four different water resourc types on duck behaviour. We expected that increasing the level of access to water would increase utilisation of the resource. We also expected that a greater amount of preening behaviour would occur at resources that provided a greater level of access to water.

MATERIALS AND METHODS

Animals and husbandry

Three thousand two hundred male and female Cherry Valley Pekin strain ducklings were hatched in two replicates on 13 March 2009 (n = 1,600) and 28 July 2009 (n = 1,600). Ducklings were managed in groups of 100 (n = 32 groups, 16 per replicate) in pens constructed on a concrete floor in a shed with forced ventilation. Pens measured 7.47 m × 3.05 m (total floor area 22.78m^2). Each pen had a straw bedded area on a solid concrete floor (5.66 m × 2.95 m = 16.70 m^2), as well as a grooved concrete ramp (0.7 m × 2.95 m = 2.07 m^2) that led to a drainage area with a rubber-slatted floor (1.25 m × 2.95 m = 3.69 m^2). The total floor area was 22.45 m^2. Ducklings had access to heat from a gas heater until 12 d post hatch, and were managed on straw litter that was topped up daily. They were restricted to a sub-section of the pen for the first 14 d post-hatch. Immediately after hatching, ducklings had access to red plastic bell drinkers that were placed directly on the straw bedding (diameter, 230mm, height, 120mm, water depth (to lip), 40mm, water width, 45mm) and hopper style feeders (88.90cm width, 144.78cm length) with a feed space of 284.4cm (i.e. 2.84cm per duck). At 14 d the ducklings were provided with access to the entire pen. They were fed a standard commercial duck feed appropriate for their age.

Treatments

Each pen was assigned to one of four treatments relating to access to water: chicken bell drinker (CHICKEN BELL **CH,** n = 8); turkey bell drinker (TURKEY BELL **TU**, N = 8); trough (TROUGH TR**,** n = 8); or bath (BATH**, BA,** n = 8). Water was provided to CH and TU ducks through 2 bell drinkers per pen (CHICKEN BELL diameter = 350mm, height = 375mm, water depth (to lip) = 40mm, water width = 45mm: TURKEY BELL diameter, 460mm, height, 380mm, water depth (to lip), 70mm, water width, 90mm) that were installed in the pens from day 20. The circumference of each CHICKEN BELL was 1010mm, providing a space allowance of 20mm per duck, and each TURKEY BELL was 1446mm, providing a space allowance of 29mm per duck. Each bell drinker was individually connected to the mains water supply, and was self-filling, with water level controlled by ball-cocks. They were emptied, cleaned and refilled with clean water each day. Ducks in the TR treatment had access to water via a single trough (width = 150mm, length = 1600mm, total height = 140mm; water depth (to lip) = 100mm) per pen. Due to the ball-cock fitting it was not possible for ducks to access the water from one end of the trough, and thus there was a space allowance of 34mm per duck. Ducks in the BA treatment had access to water via a bath (width = 550mm, length = 1000mm, total height = 150mm; water depth (to lip) = 100mm). Access to part of one side was blocked by the ball-cock housing (205mm). Thus there was a space allowance around the perimeter of the bath of 29mm per duck. Water resource equipment in each pen was located over the rubber-slatted drainage area.

Temperature and relative humidity

Ambient air temperature and Relative Humidity (RH) were recorded using Gemini Tinytag Extra Dataloggers, TGX-3580 (Gemini dataloggers (UK) Ltd., Chichester, West Sussex, UK) between 10 February and 19 February. A datalogger was suspended at a height of 180 cm at four points distributed throughout the experimental shed (between pens 1 and 2, pens 7 and 8, pens 9 and 10 and pens 15 and 16). Data were recorded at 1min intervals.

Behaviour recording

Behaviour was recorded for 6 × 1 hour periods at 3.5 frames/sec on d34 and d40 for all pens during Reps 1 and 2 (n = 32 pens in total, 8 pens/ treatment), according to the schedule in Table 1. Cameras were located above and in front of the water resource area (SONY CXD3142R, with a 2.45mm board lens: model BL2.45). Data were recorded on to a PC using network video recording software (Quadrox WebCCTV NVR).

Time budgets

The first duck to approach the water resource during each recording was identified as a focal duck. Thus on each recording day the behaviour of 6 focal ducks was recorded in each pen, providing 384 focal observations in total across both replicates. Each focal duck was observed continuously for the behaviours listed in Table 2, using the Observer software (V??). The location of each duck (in or out of the resource) was also recorded. Each observation began when the focal duck approached the water resource and terminated when the focal duck left the resource. Thus each recorded bout of behaviour could include non water-related behaviours. The duration of each bout and behavioural state, and the number of behavioural events within each bout were recorded.

Patterns of behaviour

The behaviour bout recorded from each focal duck was also included in analysis that attempted to find evidence of patterns in the sequence of behaviour performed. An initial analysis was carried out using Markov chain analysis in order to estimate an overall pattern. Following this two further analyses were carried out which give the frequency at which each pattern of two behaviour events were performed (e.g. drink/dabble followed by rest), and the frequency at which each pattern of three behaviour events were performed (e.g. drink/dabble followed by rest followed by duck/dive)

Statistical analysis

Data were analysed using the Statistical Analyses System (SAS, V9.1) and the statistical programme R. Prior to analysis, all data were examined for normality by examination of histograms and normal distribution plots (Proc Univariate; SAS).

Average temperature and RH values were calculated for each hour during the days that behaviour was recorded, then analysed using the Mixed procedure (SAS). Fixed effects were shed location, date and hour of the day. Hour, nested within day, was considered a repeated effect.

For analysis of animal measures each focal duck was considered an experimental unit. Time budget data were analysed using the Mixed procedure. Fixed effects were treatment, age (d), hour of the day, replicate and relevant interactions. Hour, nested within age and replicate was considered a repeated effect. The number and proportion of ducks resting while drinking were condensed into average values per pen per day, in order to approach normality. A similar model, excluding the effect of hour, was used for analysis.

RESULTS

Temperature and relative humidity

Behaviour recording

Duration and frequency of water related behaviour

There was no effect of treatment, or interaction between treatment and age on the duration of behaviour bouts. However, ducks tended to spend more time at the resource at 40 d (05:19 ± 00:27) than at 34 d (05:01 ± 00:27; P = 0.07).

However, the proportion of ducks performing bathing behaviours was higher in BA (46%) than in CH (24%; P<0.001), TU (28%; P<0.001) and TR (38%; P<0.05), and was higher in TR than in CH (P<0.001) and TU (P=0.01). Thus an increasing level of access to water appeared to promote bathing behaviour. Between 15% and 30% of bathing in BA was observed in the bath, but overall incidence of bathing was similar to TR. Ducks in CH performed a greater % of feather manipulating behaviour than those in the other treatments (P<0.001), but a lesser % of head-dipping behaviour (P<0.001). This treatment had the most limited water access and this limitation could have been sufficient to inhibit or prevent head-dipping. Overall, a water resource that permits at least head access to water is likely to promote bathing behaviour, which is a natural behaviour in ducks, and has a positive effect on duck welfare.

DISCUSSION

The water-related behaviour of ducks has been examined in detail at four ages at a group size that is relatively large when compared with previously published work on duck welfare and behaviour, and where all water resource interaction could be observed in each pen. Recording of behaviour at different stages of the production life cycle allows us to compare the development of water-related behaviours over time in the four treatments. Changes in behaviour over time could be important when consider- ing the impact that provision of open water could have on duck welfare at different stages of the life cycle. There are economic reasons to minimise the volume of water used and, if the water is not kept clean, the contact of the duck with water. Hence it is useful to know whether or not duck behaviour is associated with open water only at certain stages. Even where there is no interaction between age and treatment, it is of value to document changes in behaviour as ducks grow.

Unlike Jones et al. (2009), we found that fewer ducks were located at the bath than the other water resources. This was the case even though ducks at the bath could enter the resource, as well as stay next to it. Although the number of ducks in contact with the bath stayed stable throughout the study, the number located within the bath decreased over time. It is possible that the increase in duck size restricted the number of ducks that could enter the bath

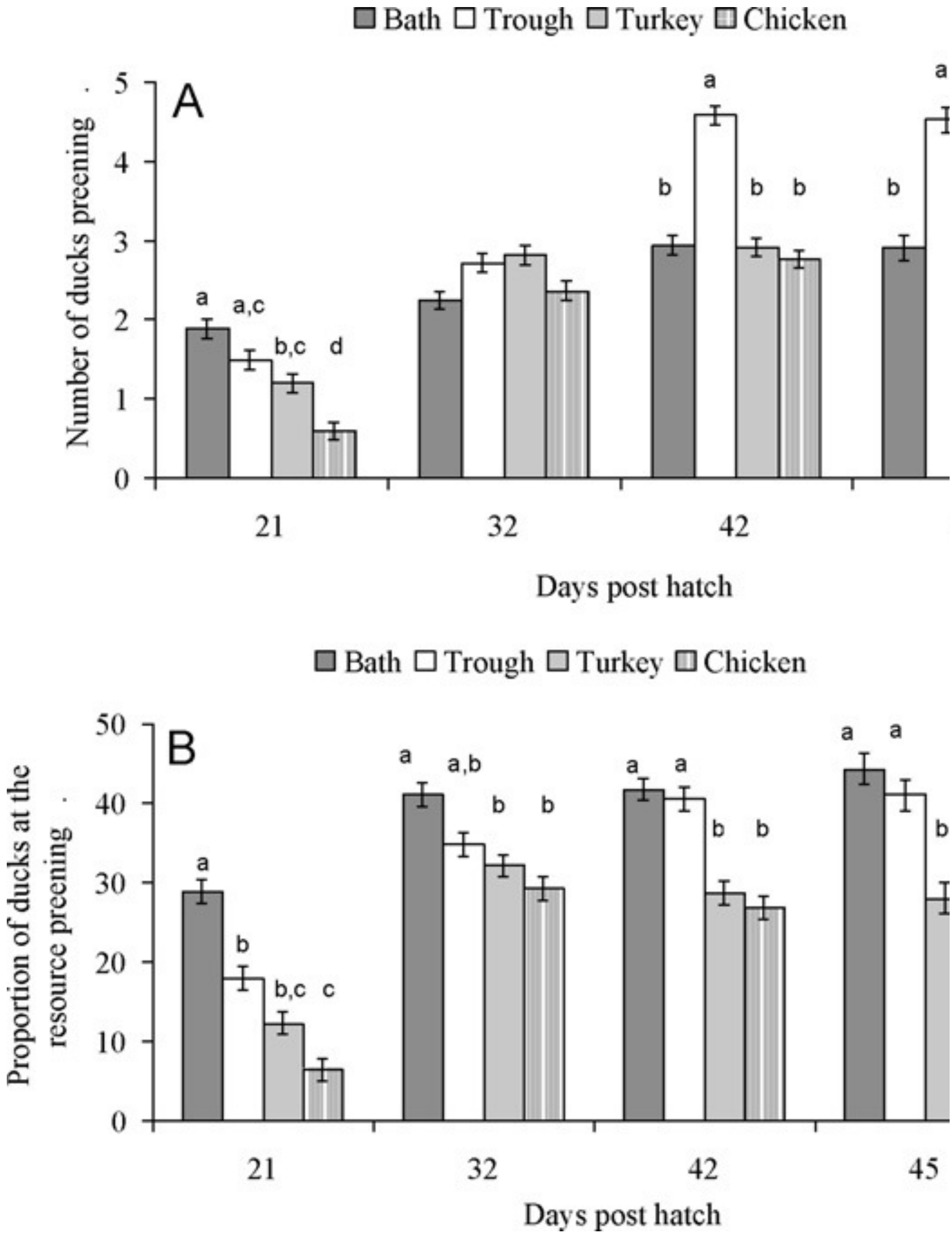
Bath Trough Turkey Chicken
A
Number of ducks preening
0
1
2
3
4
5
21
32
42
Days post hatch
Bath Trough Turkey Chicken
B
Proportion of ducks at the resource preening
0
10
20
30
40
50
21
32
42
45
Days post hatch

Fig. 5. (A) The number of ducks per pen in each treatment that was observed performing preening behaviour on each observation day. The interaction between treatment and day was P < 0.001. (B) The proportion of ducks located at the water resource in each treatment that was observed performing preening behaviour on each observation day. The interaction between treatment and day was P < 0.001. In both graphs different super- scripts a, b, c and d indicate differences at P < 0.05 between treatments on each observation day. Water resources were bath, trough, turkey bell drinker and chicken bell drinker.

Means on the same row with the same superscripts are not significantly different. [a] The proportion of the ducks preening at the resource that were in the bath.simultaneously as ducks increase in size from 1.9 to 4 kg between 24 and 43 days (O'Driscoll and Broom, 2011a). It is unlikely that space was a limiting factor at the perimeter of the bath. The space allowances permitted during this study, however, are much higher than industry norms (approximately 5.7 mm per duck; Jones and Dawkins, 2010a), and thus further work could focus on the clustering of ducks with a lower space allowance around similar resources.

Time spent at a resource often does not indicate its use, in particular when the cost of access to the resource is low (Cooper and Mason, 2000); thus a lower number of ducks in contact with the bath does not necessarily indicate that this resource is less valuable or useful to the ducks than the others. The importance of the resource to the animal, or the effectiveness of the resource in fulfilling the animal's need, may be better indicated by the behaviours the animal per- forms, and the frequency and duration of these behaviours, while at the resource. In fact, fewer ducks overall, as well as a lower proportion of ducks that were at the resource, were observed idling at the bath compared with all other treatments. It appears likely that an increased amount of access to water stimulated more activity in ducks that were present at the resource; the proportion of ducks that were idle in contact with the trough was intermediate between the bath and the chicken and turkey bell treatments. Like- wise, overall, fewer ducks at the trough were observed idle than at the turkey bell. Thus ducks that had access to open water appeared to be more purposeful in utilising the water resource, as more ducks at these resources used the time there specifically for water related activity.

Not only were more ducks overall observed idling at the more restricted water resources, but the number of ducks in the pen that either stood or rested while idling at the resource increased as the amount of access to water decreased, as did the proportion of ducks at the resource that were resting idle. There was a different pattern when it came to the proportion of ducks at the water resource that stood while idle; in this instance the proportion of ducks that stood while idle increased with increasing amount of access to water. Moreover, out of the idle ducks at the resource, the proportion that were standing also increased as access to open water increased, because the proportion that were resting decreased. This indicates that when ducks are provided with an increasing amount of access to water, incidents of idling near the resource are more likely to occur while standing. O'Driscoll and Broom (2011b) observed that ducks often perform a variety of water-related behaviours while in contact with a water resource and that these behaviours are frequently interspersed with short periods of idling. Thus, because fewer ducks at the bath and trough were idle than at the other treatments, i.e. they were more active, and active ducks are more likely to be standing, the idling behaviour that intersperses active behaviour in these treatments would have been more likely to occur while the ducks were standing. In practical terms it is more important to consider the fact that the total number of ducks standing idle at the resource reduced as access to water increased.

Increased performance of water-related behaviours at the bath is likely to mean that the ducks are more effective at drinking and preening in this treatment and this could in turn explain the lower numbers of ducks at the resource. O'Driscoll and Broom (2011b) found no difference in the duration of bouts of behaviour at the water resource in a study using the same treatments as this. However, O'Driscoll and Broom (2011a) found that feather hygiene was best for ducks with access to a bath, worst for ducks with access to a chicken bell, and intermediate for ducks with a trough. Thus it appears that the effectiveness of preening is improved with greater access to water. It is possible that improved efficiency of preening behaviour means that ducks do not return to the resource as frequently in open water treatments, hence the lower numbers at the resource. This could also explain reports of improved liveweight where ducks have access to open water, as less energy could be expended through preening behaviour and travel to the water resource (O'Driscoll and Broom, 2011a; Erisir et al., 2009). It would be of interest to investigate the rate of return to the water resource, and total time per day spent at the resource.

These data have positive implications for management of ducks at commercial level. Lower numbers of ducks at a water resource could mean that the risk of contact dermati- tis within a flock is reduced. Contact dermatitis manifests itself as ulcerations to the feet, hocks, and breast, is likely to cause pain because of tissue trauma, and occurs as a result of prolonged exposure of the skin to wet litter (Martland, 1985; Haslam et al., 2007). O'Driscoll and Broom (2011a) found that litter was wetter closer to water resources than further away when the water resource was located directly over the litter, a common situation commercially (Jones and Dawkins, 2010a). This was the case even with nipple drinkers, which do not permit any dipping of the beak or head. Fewer ducks in contact with or next to a resource means that fewer are exposed to the wet litter around it and hence has positive implications for flock health. In particular, a high number of ducks resting idle near the resources that provided more limited access to water means that there is more of the body of the duck in contact with wet litter and potentially more problems with dermatitis, in these treatments. Finally, a low number of ducks close to the resource means that there is likely to be a lower volume of manure (containing urea) deposited on the wet litter in its vicinity. The reaction between wet litter and faecal uric acid produces ammonia, which along with litter moisture is one of the environmental factors most likely to have a negative effect on poultry welfare (Dawkins et al., 2004).

For the purpose of this study, water-related behaviour was subdivided into drinking and preening behaviours. These behaviours arise from separate motivation systems so it is possible that ducks in different treatments, or at different ages, utilise the resources differently for these two types of behaviour. Our definition of drinking reflects a behaviour that was likely to result in the ingestion of water, as opposed to 'head-dipping' which is associated with bathing (van Rhijn, 1977) and a component of preening. We found that, as the amount of access to water increased, drinking decreased and preening increased. Thus the design of a water resource can also affect the relative proportions of water-related behaviour that ducks perform.

As the study progressed the number of ducks preening increased, in agreement with other studies of duck behaviour (Briese et al., 2009; Jones and Dawkins, 2010b). The number of ducks drinking decreased, unlike in the studies of Jones and Dawkins (2010b), but this was mainly because of the extremely high number of ducks observed drinking at d 21. This could be because of the novelty of the resources as ducks were only provided with access to the resources from d 20.

Several features of water resource design could potentially inhibit the performance of preening behaviour, and thus the very nature of the resource could discourage or prevent the duck from performing specific behaviours. In our study, water-related preening behaviour was primarily measured by the incidence of head- and body-dipping. The movements that are necessary to perform head-dipping behaviour could have been restricted in the turkey and chicken bell treatments; both were much more shallow and narrow than either the trough or the bath, and the resources were suspended from above the ceiling, so that the lip of the resource was at approximately breast height. It is possible that the head-dipping movement could not easily be performed, if there was not enough downward space for the duck to complete the movement comfortably within the lip of the resource, and discouraged the duck from performing this behaviour. Moreover, the design of bell drinkers means that any forward movement of the head could also have been restricted, as the beak could hit the wall of the bell.

There is good evidence that ducks have motivation to preen using water. Jones et al. (2009) found that ducks that were only provided with water through nipple drinkers showed compensatory rebound when provided with a bath at 7 weeks, although not at 5 weeks, and concluded that they had been behaviourally deprived. The presence of water that the duck can at least dip its beak into could also stimulate attempts at bathing behaviour. It has been suggested (Vinke et al., 2008) that the provision of swimming water is an incentive that can induce its own motivation in mink. This could also be the case with regard to provision of open water for bathing for ducks, and that moisten- ing of the beak or head could stimulate an increase in the number of attempts at bathing behaviour. This could par- tially explain why more ducks were observed preening in the trough treatment than in any other. The trough permitted full head immersion, and was wider and deeper than both the bell treatments, but was not large enough for ducks to enter and immerse their bodies. However, because access to water was greater in the trough than in either of the bell treatments, it could have been better at facilitating the performance of head-dipping, which could be a self-motivating behaviour. In fact there was no difference in the amount of feather manipulation between ducks in the trough and ducks in either of the bell treat- ments, but more ducks with the trough were observed performing head-dips. This could also explain the feather hygiene scores observed by O'Driscoll and Broom (2011a). The hygiene scores of ducks with a trough were better than ducks with a chicken bell, but worse than ducks with a bath, probably because ducks with the trough performed more preening behaviour, but could not actually enter the water, whereas ducks with the bath could. The fact that fewer ducks were observed preening in the treatment where full body access to water was possible, but feathers were cleaner, implies that preening is most efficient and effective in this situation. Thus a reduced preening efficiency, combined with the stimulation provided by a relatively open water resource and lack of behavioural restriction could have resulted in the high level of head-dipping in this treatment and as a consequence the higher number of ducks preening at the resource than in the bath treatment.

It is possible that thwarted attempts to perform head- dipping behaviour could have been expressed instead as movements that we classified as being components of drinking behaviour, and not preening. This could explain why the proportion of ducks performing drinking behaviour increased, and preening behaviour decreased, as the amount of access to water decreased. Shimmura et al. (2008) found that although hens in different housing systems had the same overall time budget for beak- related activity, the breakdown for types of beak use was different. It appeared that hens have a motivation for beak-related behaviour that in different environments is fulfilled with different beak movements. Water-related beak behaviour in our study consisted of drinking and head-dipping behaviours. Thus any difficulty in performing head-dipping could have resulted in the higher level of what appeared to be drinking, in the treatments with more limited access to water. Closer and finer analyses of the motor actions involved in drinking and head-dipping might shed light on whether this is the case. Dixon et al. (2008) studied the sequence of behaviours involved in for- aging, dust-bathing, and feather-pecking pecks in chickens, along with a variety of bird, novel object and water models that could be pecked. They were able to distinguish from, the morphology of the peck that the motivation under- lying feather-pecking was most closely related to that of the foraging pecks. Thus fine analysis of the beak and head movements of ducks in different environments might shed more light on the motivations underlying the behaviours.

Just as the differences occurred in the amount of drinking and preening behaviour as amount of access to water increased, there were also differences across treatments in the performance of the components of preening behaviour. The major components that we recorded were head- dipping and feather-manipulation, as well as body-dipping in the bath treatment. Considered together, as a percent- age of the ducks observed preening, the performance of these behaviours was very similar across treatments, being between 95% (chicken bell) and 98% (bath). Behaviours such as stretching, shaking, head-rolling and wing-flapping made up the remainder. However, there were significant differences in the relative proportion of each type of behaviour; with the proportion of head-dipping decreasing as feather-manipulation increased. Thus it appears that where head-dipping was either not stimulated or not possible, it was substituted by feather-manipulation behaviour, and not by other forms of behaviour such as wing-flapping or body-shaking.

5. Conclusions

We observed fewer ducks in the vicinity of a water resource that provided full body access to water. However, the ducks at this resource were observed to be idling less than at other water resources, and these ducks performed proportionately more water-related preening behaviours than ducks in the other treatments. Thus provision of a water resource that permits full body access appears to promote efficiency of preening behaviour. This helps to explain improvements in feather hygiene reported in other studies that used similar resources.

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Table 1. Schedule of behaviour observation recording times during Reps 1 and 2

Rep	Recording times
1	1000 – 1100
	1200 – 1300
	1400 – 1500
	1600 – 1700
	1800 – 1900
	2000 – 2100
2	1100 – 1200
	1300 – 1400
	1500 – 1600
	1700 – 1800
	1900 – 2000
	2100 – 2200

Table 3. Ethogram used to describe duck behaviour during focal duck recordings

Posture	
Stand	Stationary in standing posture, not engaged in any other activity
Rest	Stationary in resting posture, not engaged in any other activity
Behavioural state	
Walk	Duck performs locomotion, and not engaged in any other activity
Drink/dabble	Duck dips beak into water resource and immediately tips its head back to swallow the water collected, or duck performs rapid nibbling of beak while dipped in water resource, with head moving side to side
Wet preen	Any element of the preening sequence including nibbling feathers, head rolls and shaking, that occurs when the duck is interacting with water
Dry preen	Any element of the preening sequence, including nibbling feathers, head rolls and shaking, that occurs when the duck is not interacting with water
Dip head	Duck dips it's head rapidly into the water resource
Duck/dive	Duck
Feather nibble	Duck manipulates any part of its feathers with it's beak
Social interaction	Any interaction between ducks, including pecking, aggression and grooming behaviour
Peck object	Duck pecks at the water resource or flooring around water resource
Events	
Head toss	Flicking head back or from side to side to spread water over body
Shake	Rapid movement of whole body to and fro
Wing flap	Beating the air with the wings, designed to dry the feathers