THE INFLUENCE OF FEED WITHDRAWAL AND TRANSPORTATION ON WEIGHT LOSS, MORTALITY RATE AND CARCASS QUALITY IN BROILER CHICKENS AT SLAUGHTER

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Summary

Our investigation was conducted in order to determine the effect of feed withdrawal, light regimen, farm location and duration of transport to abattoir together with holding time at slaughter facility on clearing out of intestines and faecal contamination, weight loss and mortality rate.

Stress induced by transport may occure as a combination of external factors like loading, transportation, crowding, movement, temperature fluctuations and water and feed withdrawal. These stress factors can cause increase in corticostreroids hormon level and decrease of intestinal wall's strenght. Stressed animals exhibit increased peristaltic movement of gut content and increased excretion of pathogenic microorganisms.

It is hard to recommend an optimal duration of feed and water deprivation because of different ambient conditions. Broilers weighting 2.4kg submitted to additional three hours of feed withdrawal (15 hours instead of 12 hours) will lose 0.9% (22g) compared to broilers weighting 2.4 kg that starve three hours less (12 hours). The loss of weight during 6-8 hours of feed withdrawal is a consequence mostly because of emptying the gastrointestinal tract, a process that reduces the risk of faecal contamination of carcasses in slaughter line.

Key words: broilers, feed withdrawal, transport stress, faeces, loss of weight

Poultry industry faces with high demands for the production of safe food so that the contamination of carcasses becomes a health and economic problem more than a technical issue. According to modern concept of veterinary and zoosanitary rules, contaminated carcasses have impact on increased rate of unusable meat in a slaughterhouse. The presence of pathogenic microorganisms on the surfaces of chicken carcasses is a critical element which decreases the safety of end-products. To reduce the risk during the slaughter and evisceration procedures, providing adequate transport conditions for the broiler chickens is necessary. They include feed withdrawal before load, light regimen, shortening the transportation and welfare of poultry.

Mulder (1996) identified stress factors in poultry as raising and fattening, loading and transportation. Stress induced by transportat may occure as a combination of external factors such as crowding, movement, temperature fluctuation and water and feed deprivation. According to the author, these stresses may result in elevated concentration of corticosteroids and decreased strenght of gut's wall. Linton and Hinton (1986) concluded that stressed animals exhibit

increased peristaltic movement of gut content and more frequent excretion of pathogenic microorganisms.

The goal of our investigation was to determine the effects of feed withdrawal, light regimen, farm location in relation to abattoir and duration of transport with holding time in abattoir, on emptying the intestinal content and faecal contamination, weight loss and mortality rate in broiler chickens.

Materials and methods

Sampling on the broiler farms

Two broiler farms, each with two houses, were included in our investigation. All houses were well equipped according to technological demands and operate in system „all in - all out". The farm houses were properly cleaned, disinfected and rested for about two weeks between the flocks. Litter, in the form of wheat straw, was replaced for each flock.

The farms were selected depending on their distance to abattoir. The Farm I consisted of two houses (House 1 and 2) and was located closer, aproximately 40 km from abattoir; duration of feed withdrawal before load was 8 hours and the light intensity of 5 lux in House 1, and 12 hours and 20 lux in House 2. The two housed Farm II (House 3 and 4) was located aproximately 150 km from abattoir; in House 3, chickens were submitted to feed withdrawal for 8 hours and light intensity of 5 lux, and in House 4, for 12 hours and 20 lux.

The body weight of chickens was measured before feed withdrawal started i.e. from 10 cages containing 12 chickens per cage, on both farms and from each house. Cages were marked with white stripes to enable the measure at the holding facility at abattoir.

Sampling at the abattoir

For each flock, time of arrival was noted, duration of transportation was measured with the measured distance between the farm and the abattoir. Chickens from the marked cages were weighted i.e. 12 chickens per cage in 10 cages, from each flock. The mortality rates during transport and after holding in abattoir was noted, too. The filthiness of carcasses and feathers before slaugher was evaluated visually.

Results and discussion

The mean values of distance from farm to abattoir, duration of transport to abattoir and time of holding in abattoir, feed and water withdrawal time and light intensity for Farm I and Farm II are presented in Table 1.

When we compared the results for two farms, the difference between the transport duration was 105 km, and feed withdrawal and holding times 240 minutes, that did not influence the mortality, but effected on weight loss and emptying the intestinal contents. The purpose of starvation i.e. feed deprivation before slaughter is to empty the intestinal content in order to prevent its spillage on

carcass during processing. Total starvation before slaughter also includes feed withdrawal while chickens are still in house, during the transport and holding in abattoir.

Our results concur with some researchers (Zlatica Pavlovska, 2005) who suggested the time of feed withdrawal in chickens 8 to 12 hours before slaghter. That period is sufficient for most of the chickens to empty their gut and to minimise the impact of feed withdrawal time on carcass weight. Disturbances in feed consumption can induce overeating and feed passage through the gut in broiler chickens and therefore slower emptying of gut content. Furthermore, the number of carcasses that are contaminated with faeces or gut content in slaughter line may increase. If broilers arrive to abattoir satiated or were given smaller amount of feed, providing longer holding time in abattoir will not solve the possible contamination problem. To ensure good withdrawal effect it is necessary to reduce the conditions to which the broilers are exposed that may influence the speed of intestinal passage or saturation feed before the beginning of feed withdrawal.

Table 1.

Mean distances, transport and holding times with feed withdrawal.

	Farm groups			
	Farm I		Farm II	
	House 1	House 2	House 3	House 4
Distance (km)	40	40	150	150
Transport time (min)	45	45	155	155
Holding time (min)	60	80	55	85
Withdrawal (min)	480	720	480	720
Light intensity (lux)	5	20	5	20
Mortality (%)	< 0.1	< 0.1	< 0.1	< 0.1
Weight loss (%/h)	0.2	0.2	0.9	0.9
Average weight (kg)	2.4	2.37	2.39	2.36

Alterations in light regimen, including light-dark phases and manipulation with broilers during catching and loading into the transport cages, may significantly influence the behaviour of chickens when feed withdrawal program is conducted. Our experiences and the results of this investigation suggest that broiler chickens throw out more than 80% of feed from the gut in last 6 hours during withdrawal period in continuous light program. On the other hand, chickens held in dark cease consumption and consequently throw out gut content in elongated period. Our investigations indicate that light intensity of 5 lux has positive impact on emptying of intestinal content and sedation of broilers.

Lowering the speed of feed passage in broilers reared on floor is connected to stress procedures or less activity of chickens. The contamination rates of carcasses differ in chickens that were reared in the same house but transported in different time of a day. For example, arrival in morning hours results in higher contamination rate compared to later periods in a daytime. Some researches showed that during two hours of feed withdrawal there is more content in the crop in broilers held on floor and kept in dark than in broilers held on floor but

with light provided. In order to optimise the speed of feed passage and lower the gut content and possible carcass contamination in abattoir, it can be recommended to keep the broilers on floor litter 4-6 hours after the withdrawal starts. During that period chickens should not be disturbed and adequate light intensity of 5 lux should be provided until the load.

Water consumption increases seasons with high temperatures. This can be harmful because if water accumulates in abdomen of chickens it may result in ascites. That is why water withdrawal program is equally important as feed withdrawal program. Exessive water consumption and faecal contamination have to be balanced with loss of water that may cause dehidration in chickens. If chickens starve for more than 4 hours they start eating the litter and take larger amount of water. Stomach filled with litter and liquid is found in chickens that starved for longer time. The presence of liquid and litter can be spilled during evisceration and increase carcass contamination.

Chickens submitted to longer feed withdrawal lost their weight from they had at the time deprivation started until the slaugher. The process of losing weight develops in the following way: significant decrease during the first four hours (0-4h) of starvation, than progressive loss of weight during the next four hours (4-8h) and significantly slower loss of weight during the next (sometimes the last) four hours (8-12) of starvation. This loss of weight during the period of 6-8 hour of starvation is mostly a consequence of throw out of intestinal content. The results of investigations state that loss of weight increases if broiler chickens are kept without feed more than 6 hours at farm premisses, because then they start to excrete water and nutrients from tissues and impacts the carcass grades. The loss of carcass grade (harvest grades) is indispensable.

Weight loss caused by feed withdrawal is different in broilers and depends on age, sex, ambient temperature, feed quality and rearing conditions before slaughter, duration of transport, farm location and temperature during holding in abattoir. Weight loss may range from 0.25% to 0.35% per hour, during the withdrawal period, but it may reach 0.5% per hour if kept at 30°C ambient temperature. Weight loss can be lower if the withdrawal period starts in the evening hours instead afternoon or the midnight. Male chickens may lose 0.4% body weight more than female during 10 hours of feed deprivation. It is hard to define the standard period of feed deprivation as optimally recommended because it differs depending on ambiental conditions. Broilers weighting 2.4kg submitted to additional three hours of feed withdrawal (15 instead of 12 hours) will lose 0.9% (22g) compared to broilers with same weight that starve three hours less (12 hours). Therefore on many prcessing plants, where contract is made between farmers and slaughterhouse holders, the income is calculated based on body weight of chickens at abattoir because of prolonged starvation time. Surely this does not imply that broilers not submitted to feed withdrawal have better carcass grade (harvest grade). In fact, chickens with the same weight will have different carcass (harvest) grades depending on whether they were/not submitted to feed

withdrawal. Lower carcass (harvest) grades are present in chickens that were not submitted to feed withdrawal because their live weight also includes gut content weight.

Conclusions

The duration of feed withdrawal in chickens before slaghter from 8 to 12 hours enables them to empty their gut and to minimise the impact of feed withdrawal time and duration of transportation on mortality and carcass weight.

There is no standard period of feed deprivation that can be recommended as optimal because it differs in relation to ambiental conditions. Broilers weighted 2.4kg submitted to additional three hours of feed withdrawal (15 instead of 12 hours) will lose 0.9% (22g) compared to broilers with same weight that starve three hours less. The loss of weight during 6-8 hours of starvation mostly occurs because of throw out of intestinal content and decreases the risk of faecal contamination in carcasses.

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