Influence of the main cereal and feed form of the rearing phase diets on performance, digestive tract, and body traits of brown-egg laying pullets from hatch to 17 weeks of age[1]

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ABSTRACT The effects of the main cereal and feed form of the rearing phase diets on growth performance, gastrointestinal tract characteristics, and body traits were studied in brown-egg pullets from hatch to 17 wk of age. Eight dietary treatments that were a combination of 2 main cereals (corn vs. wheat) and 4 feeding programs were used. The feeding program consisted in feeding crumbles from 0 to 5, 0 to 10, or 0 to 17 wk of age followed by mash until 17 wk, or feeding mash continuously from 0 to 17 wk. Each treatment was replicated 9 times. From hatch to 17 wk of age, pullets fed corn had similar ADG but poorer feed conversion ratio (FCR; $P < 0.001$) than pullets fed wheat. Also, pullets fed crumbles continuously (0 to 17 wk) had greater ADG (12.3 vs. 11.5 g; $P < 0.001$) and better FCR (4.21 vs. 4.36; $P < 0.001$) than pullets feed mash continuously, with pullets that were changed at any age of the rearing period from crumbles to mash feeding showing intermediate results. At 17 wk of age, the relative weights (% BW) of the gastrointestinal tract and gizzard were greater in pullets fed corn than in pullets fed wheat ($P < 0.01$) but the relative length (cm/kg full BW) of the small intestine, body, and tarsus was not affected. Pullets fed crumbles continuously had lighter gizzards ($P < 0.001$), higher gizzard pH ($P < 0.001$), and were shorter ($P < 0.01$) than pullets fed mash continuously, with pullets fed the other 2 treatments being intermediate. In summary, wheat can be used in substitution of corn in pullet diets without any adverse effect on growth performance. Feeding crumbles improves pullet performance but hinders gizzard and gastrointestinal tract development. Growth performance, gastrointestinal tract, and body traits of the pullets re-adapt quickly to changes in feed form of the rearing diets.

Key words: corn, crumbles, gastrointestinal tract development, mash, wheat

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INTRODUCTION

Dent corn (*Zea mays* L.) and soft wheat (*Triticum aestivum* L.) are the most common cereals used in poultry diets. Because of differences in growing and storage conditions, and nonstarch polysaccharides (**NSP**) content, the nutritive value of wheat is more variable than that of corn (Kim et al., 1976; Mollah et al., 1983; Gutiérrez-Álamo et al., 2008) and consequently its use in diets of young birds is limited (FEDNA, 2010). In addition, corn has on average less protein (7.7 vs. 10.2%) but more energy (3,260 vs. 3,100 kcal AME_n/kg) than wheat (FEDNA, 2010). Several researches have compared diets based on corn or wheat in broilers (Crouch et al., 1997; Mathlouthi et al., 2002; Masey-O'Neill et al., 2014), pullets (Frikha et al., 2009a, 2011), and laying hens (Lázaro et al., 2003a; Safaa et al., 2009; Pérez-Bonilla et al., 2011). In most cases, the authors concluded that wheat can be used in substitution of corn without any effect on performance, provided that the feed is supplemented with NSP enzymes. However, Frikha et al. (2009a) reported a 1.5% reduction in ADG in pullets fed wheat with NSP enzymes as compared with pullets fed corn from 0 to 17 wk of age, although no differences in feed conversion ratio (**FCR**) were detected. Also, these authors observed that at 6 wk of age the gizzard was lighter in pullets fed wheat than in pullets fed corn.

Hens that are light at the initiation of the laying period produce less eggs that are smaller during the whole cycle than hens that are heavy (Leeson et al., 1997; Pérez-Bonilla et al., 2012a,b). The use of crumbles during the rearing phase might be a sound nutritional strategy for improving BW of the hens at the onset of egg production (Frikha et al., 2009b; Saldaña et al., 2015). Under commercial conditions, broilers are frequently fed crumbles for the first 2 to 3 wk of life and then pellets until slaughter, a practice that results usually in improved ADG and FCR (Amerah et al., 2007a; Abdollahi et al., 2013a; Serrano et al., 2013).

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