

Inclusion of fiber in diets for brown-egg laying pullets: Effects on growth performance and digestive tract traits from hatching to 17 weeks of age¹

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ABSTRACT We investigated the effects of fiber inclusion in the diet on growth performance and digestive traits in pullets from hatching to 17 wk of age. The control diets of the 3 feeding periods (0 to 5 wk, 5 to 10 wk, and 10 to 17 wk) were based on corn and soybean meal and did not include any additional fiber source. The experimental diets included 2 or 4% of cereal straw or sugar beet pulp (SBP) at the expense (wt:wt) of the control diet. From 0 to 5 wk of age, fiber inclusion did not affect pullet performance. From hatch to 17 wk of age, the inclusion of straw had little effect on pullet performance but the inclusion of 4% SBP reduced (ADG) ($P < 0.05$) and reduced feed conversion ratio (FCR; $P < 0.001$). Pullets fed straw had greater ADG ($P < 0.05$) and better energy conversion ratio ($P < 0.01$) than pullets fed SBP. An increase in fiber from 2 to 4% reduced FCR ($P < 0.05$). Body weight

uniformity was not affected by diet. Fiber inclusion increased the relative weight (% BW) of the gizzard at 5 wk ($P = 0.056$) and 10 wk ($P < 0.01$) of age, but no differences were detected between fiber sources. At same ages, the relative length (cm/kg BW) of the pullets ($P = 0.058$ and $P < 0.01$, respectively) and tarsus ($P = 0.079$ and $P < 0.05$, respectively) was higher in pullets fed SBP than in pullets fed straw. Fiber inclusion, however, did not affect any of these traits at 17 wk of age. In summary, the inclusion of 2% straw at the expense (wt:wt) of the whole diet did not affect pullet performance at 17 wk of age. An increase in the level of straw from 2 to 4% reduced FCR but did not affect ADG. The inclusion of SBP, however, reduced pullet growth, with effects being more pronounced at the higher level.

Key words: cereal straw, gastrointestinal tract, pullets, sugar beet pulp

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INTRODUCTION

Traditionally, the inclusion of fiber in poultry diets was limited because of the poor adaptation of the gastrointestinal tract of young birds to fibrous ingredients (Sell 1996; Uni et al., 1999), which affects feed intake, nutrient digestibility, and growth (Janssen and Carré, 1985; Sklan et al., 2003). Recent research, however, has shown that the inclusion in the diet of moderate amounts of certain insoluble fiber sources might improve gastrointestinal function and maximize growth performance in broilers (Jiménez-Moreno et al., 2009a; Svihus, 2011; Incharoen, 2013) and pullets (Guzmán et al., 2015) during the first stage of life. Numerous ingredients, including oat hulls (OH), sunflower hulls (SFH), pea hulls, rice hulls, soy hulls, and sugar beet pulp (SBP), have been tested as a source of additional fiber in poultry diets (González-Alvarado, 2010;

Kalmendal et al., 2011; Jiménez-Moreno et al., 2011, 2013a). Straw is an insoluble fiber source of uniform quality, but the information available on its use as a dietary component in poultry diets is scarce. In fact, no research is available on the effects of straw on growth performance and gastrointestinal tract development of pullets from hatching to 17 wk of age. On the other hand, SBP, a soluble fiber source, has been largely studied as a source of dietary fiber in broilers (Pettersson and Razdan, 1993; Jiménez-Moreno et al., 2009b) but little information is available in pullets. Most papers that compared the effects of fiber in broilers reported greater benefits with the inclusion of insoluble sources than with the inclusion of soluble sources (González-Alvarado et al., 2010; Jiménez-Moreno et al., 2013a). Insoluble fiber stimulates more the development of the upper part of the gastrointestinal tract (GIT) than soluble fiber (González-Alvarado et al., 2008), which, in turn, improves the development and facilitates the adaptation of the digestive tract of the birds to consume more feed. However, no information is available comparing insoluble and soluble fiber sources in diets for pullets from hatch to 17 wk of age.

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