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Feeding *Saccharomyces cerevisiae* to *S. enteritidis* and *C. jejuni* challenged poultry: prevalence reduction of pathogens in cecum, skin and fecal microbial population

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Abstract *Saccharomyces cerevisiae* demonstrated antagonistic activity against various pathogens both in vivo and in vitro, including the contamination of *Salmonella* and *Campylobacter* in ceca and feces. It seems that yeast can survive the low pH environment of the proventriculus and gizzard of chickens to reach the intestine and ceca acting as a pathogen adherent microflora (PAM) and binding pathogens that may enter the gastrointestinal tract before the bacteria can attach to the chicken's intestinal wall. At the moment no relevant data are available on the effect on *Saccharomyces cerevisiae* on neck and breast skin contamination by *Salmonella* and *Campylobacter*. The aim of this trial was to investigate the effect of yeast supplementation in broiler chickens on *Salmonella enteritidis* and *Campylobacter jejuni* in feces, cecum and on contamination of breast skin and neck skin. 480 Hubbard female chickens on day one of life were divided in 2 groups with 12 replicates of 20 subjects each, for a 38-day trial. Chickens were reared in environmentally controlled conditions: 33°C under the brooder, 30°C in the living area, 60% humidity and 1 m³/kg body weight (BW) ventilation with decreasing temperature and increasing humidity and ventilation until the end of the trial (19°C, 65% humidity, 3.4 m³/kg BW). Prestarter (0-10d), starter (11-20d) and growing (21-38d) diets were adopted during the trial with decreasing CP (from 21.40% to 19.93% as fed) and increasing EE (from 5.28% to 7.56% as fed) content of the feed. All chickens were fed the same basal diet on the respective feeding phase and administered (Y) or not (C) Levucell® SB20 (*Saccharomyces cerevisiae* type bouardii I-1079) at a concentration of 10⁶ CFU/g in the feed. Birds were orally challenged at 10 days of life (*S. enteritidis* with 1x10⁵ cfu/bird and *C. jejuni* inoculated at 3x10⁵ cfu/bird), Average daily gain (ADG) and Feed Conversion Rate (FCR) were calculated for each rearing phase per replicate. *Salmonella* and *Campylobacter* in feces were detected and enumerated on day 20 and 38. At 0, 10, 20 and 38 days of the trial, fresh fecal droppings samples were collected for lactobacilli, yeast and coliforms count. On day 10 post infection (PI), 10 animals per replicate were slaughtered and pooled ceca content of 5 birds per replicate were analysed for *Salmonella* and *Campylobacter* detection and enumeration. On 1 subject per replicate, neck and breast skin were tested for presence of *Salmonella* and *Campylobacter*. Total yeast count was also determined on ceca content. On day 38, all the remaining chickens were slaughtered and analysed as described for

day 10 PI. Experimental data were analysed by a General Linear Model (GLM) procedure of SAS considering two experimental periods from 0 to 20 days and from 20 to 38 days. Growth performance was not affected by the dietary treatment. No differences were detected between the experimental groups for coliforms ($P=0.10$) fecal content, while higher yeast and lactobacilli ($P=0.01$) count was detected in Y birds than in C group. At day 38, Salmonella enumeration and frequency tended to decrease in Y group in feces (-25%; $P=0.06$), cecum (-25%; $P=0.06$), neck (-41%; $P=0.03$) and breast (-33%; $P=0.08$). No Campylobacter were detected in feces at 10d ($P<0.01$) or 28d ($P=0.06$) PI in Y birds for all the trial, while the presence in neck skin was not detected on day 10 PI in Y ($P=0.01$) as opposed to C birds that were Campylobacter positive. At first slaughtering time, Campylobacter colonization was significantly lower in yeast-fed birds in cecum (-42%; $P=0.01$), and breast skin (-58%; $P=0.04$). At the second slaughtering time, Campylobacter was significantly reduced in breast skin (-42%; $P=0.02$) while tended to decrease in feces (-25%; $P=0.06$). The present study shows that the inclusion of Levucell® SB20 (*Saccharomyces cerevisiae* bouardii CNCM I-1079) can significantly control Campylobacter carriage in chickens with some positive results also on Salmonella contamination, thus reducing the contamination of carcasses with both food borne pathogens

Keywords *Saccharomyces bouardii*; Salmonella; Campylobacter; yeast; chicken