**Introduction**

In the modern intensive poultry production, birds are exposed to considerable stress during their productive lifetime. The gastrointestinal tract of newly hatched chicks is immature and sterile. It begins to develop function and its microflora when it starts to ingest feed. At this time, the chick is very susceptible to pathogenic microorganisms **(Adams, 2004)**.

*Salmonella* Enteritidis(SE) is still one of the leading causes of food-borne infections in the world, mainly due to the consumption of food prepared from poultry meat and eggs **(Rabsch *et al*., 2001)**. On the other hand, a significant decline in growth performance was reported in broilers that were challenged with *Salmonellae* **(Marcq *et* *al*., 2011)**.

Effective control of pathogens, such as *Salmonella*, represents a major task to the poultry producers worldwide. Under such circumstances antibiotics as growth promoters in food animal production have been used since 1946 throughout the world **(Chowdhury *et al*., 2009)**. They are thought to stabilize the intestinal microbial flora and to prevent some specific intestinal pathogens **(Waldroup *et al*., 1995)**. Also vaccination is asupportive approach for establishing immunity in birds for prevention of *Salmonella* infection in poultry farms **(Bäumler *et al*., 2000)**.In recent years, concerns about antimicrobial resistance have grown, but the main concerns have been focused specifically on resistance within the food supply **(Barza *et al*., 2002 and Cui *et al*., 2005)**.

This has led to the application of non-antibiotic chemical substances **(Yang *et al.,* 2007)**. Among the candidate replacement are organic acids (both individual as well as blends of several acids). Organic acids are among the alternative growth promoters that are already being used in practice for decades, and stimulate growth performance in poultry **(Vogt *et al*., 1982; Patten *et al*., 1988; Dibner *et* *al*., 2002 and Dibner *et al*., 2004)**.

The supplementation of organic acids to poultry diets was shown to suppress the growth of certain species of bacteria, mainly acid-intolerant species, such as *Salmonella*, *E.*Coli, *Clostridium* Perfringens, *Listeria* Monocytogenesand *Campylobacter* **(Van Immerseel *et al*., 2002 and Awaad *et al*., 2014)**, and enhanced nutrient utilization, growth and feed efficiency **(Denil *et al*., 2003)**.

Amongst the organic acids; short chain fatty acids (SCFA) which are considered as potential alternative to antibiotic growth promoter **(Van Immerseel *et al*., 2005)**. Butyric acid is one of SCFA, which has higher bactericidal activity when the acid is un-dissociated **(Lesson, 2007)**. It can be used for the treatment of several intestinal bacterial infections like salmonellosis **(Van Immerseel *et al*., 2005 and Fernandez-Rubio *et al*., 2009).**

The objectives of the present study were to determine the expected effects of usage of sodium-butyrate encapsulated in palm fat in comparison with enrofloxacin when administrated in (SE) challenged broiler chickens on:

1. Disease picture (signs, mortalities and gross lesions) of chickens.

2. Chickens zootechnical performance variables.

3. Intestinal colonization (bacterial isolation and enumeration) of (SE) in chickens.

4*.* Morphological characterization (electron-microscopy) and virulence gene of (SE) using polymerase chain reaction (PCR) test.

5. Chickens gut integrity (intestinal histo-morphometry).