

Bacteriophage: a potential performance aid for broiler chickens

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BACKGROUND

The increasing consumption of poultry meat worldwide highlights a growing need to address problems with flock performance. Feed makes up the largest part of broiler chicken production costs and poorer performing flocks (Fig 1.) may require greater amounts of feed or extra time to achieve saleable weights, which impacts farmers' profits (1). Further losses can occur due to difficulties processing smaller birds at the abattoir.



Fig 1. Same-age flock containing birds of poor performance. Poorly performing birds are identified with blue arrows.

Prior to 2006 in the EU and UK, subtherapeutic doses of antibiotics, known as antibiotic growth promoters (AGPs), were provided to flocks in order to enhance performance. Due to major concerns of antimicrobial resistance (AMR) and antibiotics entering the food chain (2), along with increased customer demand for poultry products from flocks raised without antibiotic use, nontherapeutic antibiotic use has subsequently been banned in the EU and UK. Further banning of all use of routine antibiotics in farming came into force in the EU in Jan 2022 (Regulation (EU) 2019/6 on Veterinary Medicines.) Alternatives such as herbal extracts, essential oils, prebiotics, probiotics, enzymes and phytochemicals exist but none alone are as effective as AGPs (3).

Bacteriophages (aka phages) are naturally occurring viruses which specifically parasitise bacteria and may regulate gut bacteria, thus potentially providing greater nutrition for the bird's growth. Most investigations into phage use focus on therapeutic use in humans and pigs (4, 5). In poultry, the therapeutic use of phage has been investigated and has seen success in controlling infections such as salmonella (6). However, the characterisation of phage communities (phageomes) in the gut and their relationship with constituent gut bacteria (bacteriomes or microbiomes) is not well understood and little work has been carried out on developing natural phage cocktails and investigating their impact on broiler performance.

AIMS AND OBJECTIVES

The aim of the project is to produce an innovative phage cocktail that will enhance broiler chicken performance.

Objective 1 is to characterise phageomes from good and poorly performing broiler flocks at different lifecycle stages from several gut tissues, caecum, ileum and duodenum.

Objective 2 is to culture selected phageomes identified from objective 1 and investigate their potential for controlling bacterial populations by in vitro methods.

Objective 3 is to feed refined phageome products to broiler chicks to determine their potential as performance enhancers.

WORKFLOW

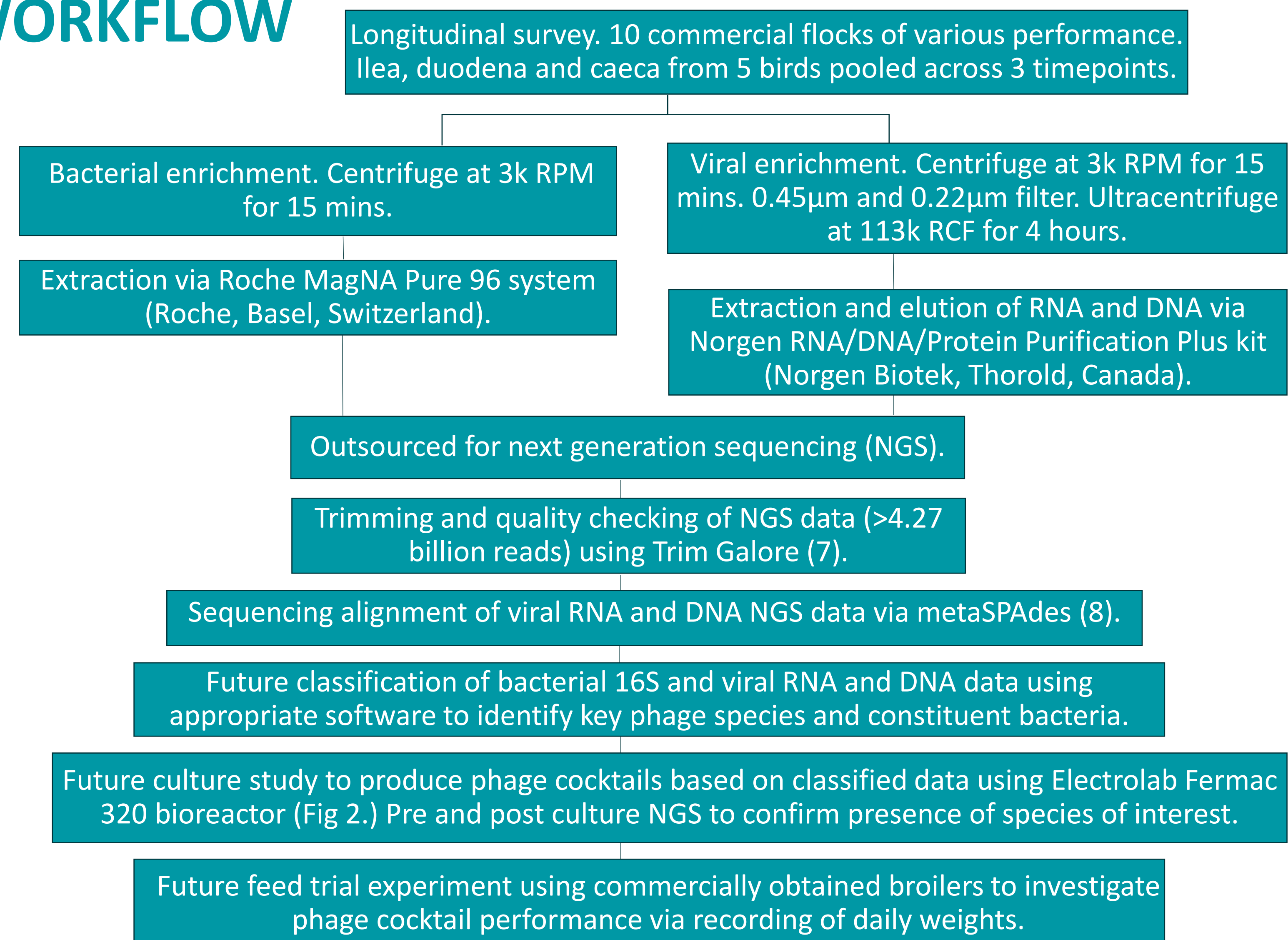


Fig 2. The Electrolab Fermac 320 bioreactor system (Electrolab Biotech, Tewkesbury, England) offers precise control of various environmental factors such as temperature and pH in the process of culturing. (9)

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