CHAPTER 1
INTRODUCTION

1.1 Background information

Fresh or processed ostrich meat has been increasingly accepted in recent years and is promoted as a healthy "red meat" because of its exceptional nutritional properties and its low fat, cholesterol and salt levels. Ostrich meat, in general, is similar in protein, amino acid and mineral contents to other red meat sources (Cooper and Horbañczuk, 2002; Girolami *et al.*, 2003).

Several ostrich meat products (Italian fermented sausages, "Vienna" ham and pressurised ostrich meats) are already found in European markets. Traditional sausages, known to Thai people as "Yor", are the most popular meat product in Thailand. It is made by grinding and blending the meat with ice cubes, fat, curing and flavoring agents (sodium chloride, phosphate, garlic, pepper, sugar, starch and monosodium glutamate). The finished product has a paste-like texture in its raw state but gradually changes into a more rigid structure during cooking. For other components in meat yor, non-meat protein such as soy protein, wheat gluten, whey protein and hydrocolloids can be added to alter the appearance, flavour, emulsification and texture of food-products (Barbut *et al.*, 1996; Pietrasik, 2003; Thai Industrial Standards Institute, 1996).

Macromolecular hydrocolloids or gums are considered to influence several the functional properties of processed meat products. These that are commonly used in comminuted meat products include emulsifiers, water and fat binders and "texture modifying" ingredients. In addition, polysaccharide gums have been reported to affect the thermal transition temperatures of meat proteins (DeFreitas *et al.*, 1997; Fonkwe *et al.*, 2003; Pietrasik, 2003). Addition of prehydrated or thermally activated hydrocolloid materials may structurally interfere with cross-linking required for a protein gel network formation. This may give rise to "weaker" gel structures (Pérez-Mateos *et al.*, 2001).

Yor contains a range of hydrocolloids added to improve texture and appearance. In this study three hydrocolloid systems including carboxymethylcellulose (CMC), locust bean gum (LBG) and xanthan gum (XAN) were selected and examined to assess their effects on the ostrich meat product. While it is appreciated that the gums themselves are unlikely to produce a "network" systems at the concentrations added (approximate 1% (w/w)) even after pressure treatment considerable organoleptic changes have been observed (Steyer *et al.*, 1999).

High pressure processing of meat has been a relatively new and challenging area of research because of its potential in extending shelf-life (Fonberg-Broczek *et al.*, 2005). Moreover, pressure treatment brings about changes in the constituent molecules of meat, and may affect functional properties of proteins such as solubility, emulsification, surface tension, hydration and gelation properties (de Lamballerie-Anton *et al.*, 2002). High pressure can improve the texture of meat by increasing elasticity, water holding and binding properties, soften the structure as well as giving it an improved glossy appearance (Apichartsrangkoon *et al.*, 1998). To date little information is published with regards to the effects of high pressure on ostrich meat systems.

The use of high pressure to induce gelation of proteins in foods first aroused interest in the late 1980s. This technology can be used to create new products from meat or fish muscle (new textures and/or flavours), or to create analogs of existing products (Cheftel and Culioli, 1997; Messens *et al.*, 1997). There is an additional advantage in that pressure allows gels to form faster than in normal thermal gelation and also enhances the gel-forming capacity of poor functional quality fish mince (Pérez-Mateos *et al.*, 1997). Muscle-protein gelation is essential to the formation of a desirable meat product texture. Furthermore, the degree of firmness, springiness and cohesiveness of the product is critical in manufacturing an acceptable product (Marangoni *et al.*, 2000). The most commonly textural measurement of protein gelation can be obtained by different single-point measurements that basically include shear, penetration, compression, tension and torsion (Barbut, 2002; Johnston, 1995). Another dynamic measurement such as creep and stress relaxation test is more concentrated on structure modification of the products. These tests are mostly used for monitoring gelling and emulsional properties of samples (Apichartsrangkoon, 2002).

This research was proposed to produce ostrich-meat yor as an alternative healthy food product by adding value to the trimmings of fresh meat. The outcome of this research led to the innovation of high pressure processing and the technique of adding gums to the product was a very challenging area for this investigation especially in rheological characteristics.

1.2 Research Objectives

General objective of this work was to investigate the effects of adding hydrocolloids and high pressure processing on physicochemical properties and microbial quality of ostrich-meat yor (Thai sausage). The benefits of this research led to obtaining the optimum condition of high pressure processing, value adding to the trimmings of fresh ostrich meat and production of an alternative healthy product for the both domestic and international consumer markets.

Specific research objectives included the followings:

1) To investigate the chemical compositions including moisture, fat, ash, protein and carbohydrate contents and thermal properties of ostrich-meat trimmings, carboxymethylcellulose, locust bean gum, xanthan gum and tapioca starch.
2) To investigate the effects of pressure levels, temperature, holding time and their combination on physical, chemical and thermal properties of ostrich-meat yor.
3) To investigate the effects of carboxymethylcellulose, locust bean gum and xanthan gum on physical, chemical and thermal properties of ostrich-meat yor after high pressure processing.
4) To evaluate microbiological aspects of product quality including *Salmonella* spp., *Staphylococcus aureus*, *Clostridium perfringens* and *Escherichia coli* of raw and pressurised ostrich-meat yor.