I. INTRODUCTION

A. BACKGROUND

Gastrointestinal is an important part of body metabolism which affect human health. Human realize that bad lifestyles and behaviors, such as smoking, heavy alcohol consumption, stress, high carbohydrate diet, inadequate consumption of fruits and vegetables can affect their gastrointestinal health. One of the diseases which attack gastrointestinal is colorectal cancer (CRC). Global cancer data showed that colon and rectum cancers (also known as colorectal cancer/CRC) accounted for about 1 million new cases in 2002 (9.4% of the world total). In terms of incidence, colorectal cancers rank fourth in frequency in men and third in women in the world. Around 15% of CRC is inherited (direct and indirect), the others is acquired. Up to 80% of CRC cases have been attributed to diet. This fact shows that colorectal cancer can be prevented through healthy food and lifestyle.

Colorectal cancer can be prevented by the presence of short chain fatty acid (SCFA) in colon, especially butyric acid. SCFA are organic fatty acids with 1 to 6 carbon atoms which arise from bacterial fermentation of polysaccharide, oligosaccharide, proteins, peptide, and glycoprotein precursors in the colon. SCFA are the main products of anaerobic microbial fermentation in the large intestine and affect colonic health by providing energy to the epithelial cells. The organic acids produced in the colon are acetic acid, propionic acid, and butyric acid. The concentrations of SCFA in the colon are affected by composition of the diet, type and quantity of substrates that survive in the large intestine, and microorganism inside the intestine.

Interest in butyrate role as a possible protective agent has arisen from its anti-proliferative effects on cells in vitro including on colon tumour cell lines. In particular, butyrate is preferred as the energy source for the colonic mucosa and it has been implicated in the protection against colitis and colorectal cancer. Butyric acid also inhibit cancer cell growth by stimulating cancer cell to kill itself (apoptosis) and inhibit DNA repairing enzyme activity. Approximately 95% of the butyrate produced by colonic bacteria is transported across the epithelium, but concentrations in portal blood are usually undetectable as a result of rapid utilisation. Butyrate specific benefit can be achieved by an intake of resistant starch, oat bran, and wheat bran that result in a good fermentation properties.

Nowadays, people pay more attentions to functional foods. Functional food is defined as a food which consumed not only to fulfill nutrition requirement but also give health benefit to our body. Many foods can be classified as functional food, one of them is resistant starch. Resistant starch is complex of undigest carbohydrate which can give benefit effect to our intestinal health. Resistant starch can be obtained from many sources, such as rice, corn, maize, wheat, sago, banana, potato, and sweet potato.

Resistant starch (RS) is starch that escapes digestion in the small intestine and can be fermented in colon by anaerobic bacteria resulting in the SCFA formation which contribute to the gastrointestinal health. Resistant starch (RS) can be classified into four main types, of which the first three may occur in a typical human diet. RS1 includes physically entrapped starch within whole plant cells and food matrices (e.g. coarsely milled grain). RS2 consists of native starch granules that are highly resistant to digestion by α-amylases (e.g. green banana, high amylose maize starch). RS3 comprises retrograded starches, formed when starchy foods are cooked and cooled. RS4 comprises chemically modified starches (e.g. esterified starches) where the modification interferes with the amylolytic activity of digestive enzymes.

Some carbohydrates, such as sugars and most starch, are rapidly digested and absorbed as glucose into the body through the small intestine and subsequently used for short-term energy needs
or stored. Resistant starch, on the other hand, resists digestion and passes through to the large intestine where it acts like dietary fiber. In large intestine, resistant starch fermented by microorganism resulting SCFA. Previous research showed that dominant microflora in human intestinal was Clostridium, Eubacterium, and Fusobacterium that include butyrate producing species.

Sweet potato (Ipomoea batatas) is one of staple food in Indonesia because contains high carbohydrate level as energy source. Sweet potato can be consumed directly as food or processed further become sweet potato flour or sweet potato starch. Unfortunately, utilization of sweet potato is not optimum, however Indonesia is the biggest country which produce sweet potato in the after China. Total production of sweet potato was 2,057,913 ton per year. High carbohydrate level is correlated to high starch level, so it can be utilized as resistant starch source. In recent years, a considerable number of studies have focused on the importance of type 3 resistant starch (RS) as a substrate for colonic fermentation. Thus, sweet potato is very potential to develop as resistant starch source.

B. OBJECTIVE

The objective of the research were to study short chain fatty acid profile produced by Clostridium butiricum BCC B2571 during fermentation of type 3 resistant starch of sweet potato and to determine the effect of concentration of resistant starch to the SCFA formation by Clostridium butiricum BCC B2571.