

1 **Effects of sweet potato and separated dietary fiber on gut**

2 **microbiota composition and metabolic activity.**

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5 **Outline**

- 6 1. Introduction
- 7 2. Effects of digested flours from four different sweet potato (*Ipomoea batatas* L.)
8 root varieties on the composition and metabolic activity of human colonic
9 microbiota *in vitro*.
- 10 3. Dietary fiber isolated from sweet potato residues promotes a healthy gut
11 microbiome profile.
- 12 4. Conclusion

13 **Abstract**

14 Sweet potato (*Ipomoea batatas* L.) is one of the most important plant foods in the world,
15 producing more biomass and nutrients than any other food crop. Early studies have
16 found high contents of non-digestible fermentable carbohydrates in sweet potato roots.
17 Interactions between intestinal microbiota and non-digestible dietary components are
18 important in health associated with prebiotic effects. Therefore, this study aims to
19 investigate the prebiotic properties and metabolic activity of the gut microbiota of sweet
20 potatoes and their separated dietary fiber. Whether sweet potato root flour (SPRF) or
21 dietary fiber from sweet potato residues (SPDF) shows an increase in the concentration
22 of *Bifidobacterium* and *Lactobacillus*, whereas a decrease of *Bacteroides* and
23 *Clostridium* after *in vitro* colonic fermentation. As a result, both SPRF and SPDF have
24 a positive prebiotic index, demonstrating that beneficial microorganisms selectively
25 utilize them. To further explore this effect, Wistar rats were fed with 3% or 15% SPDF
26 for 4 weeks. It was found that SPDF significantly increased the Bacteroidetes to
27 Firmicutes ratio at the phylum level, and the amount of *Akkermansia* was also increased
28 at the genus level. Microorganisms turn SPRF or SPDF into short-chain fatty acids
29 (SCFA), causing an increase in SCFA concentration while pH decreases. Additionally,
30 SPDF supplementation resulted in a higher villus height to fossa depth ratio, improving
31 digestion and absorption in the gastrointestinal tract. In summary, both SPRF and SPDF
32 indicate significant prebiotic effects and positive modulations of the microbiota
33 composition and metabolic activity, showing their potential to be a functional food.

References

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