FROM PEST TO PLATE

Why cricket farming in New Zealand?

John Hart - Rebel Bakehouse

WHO AM I?

- Innovator with 25 years in the technology and farming industries
- Consult at the intersection of food and tech
- Driven by sustainable food production
- Built the first commercial pilot cricket “farm” for Breadcraft in 2018

MEET THE GANG

WHY CRICKETS?

- Sustainable, ethical protein
- <1% of the GHG emissions of red meat per kg
- Fraction of the land and water use to grow a kg of protein
- As much protein and iron as beef, more than chicken or pork
- Farmed vertically indoors, almost anywhere

Nature's "alternative protein" already exists

WHY CRICKETS?

The ins and outs of Rebel crickets

FEED

Converts food into protein almost 10x more efficiently than cows

NUTRITION

Protein 62%
Fat 27%
Omega 3+6 10%
Carbs 5%

NZ Black Field Cricket

LAND

Grow in indoor farms so can be stacked vertically almost anywhere

INSOLUBLE FIBRE

Gut health

WATER

Less than 1% of the water needed to grow beef

GREENHOUSE GASES

Zero methane and only a fraction of the CO2 of other protein production

ALLERGENS

Gluten: None
Crustacean: Trace

WHAT IS A CRICKET?

- Teleogryllus commodus - NZ Black Field Cricket
- Pasture pest in NZ
- Native to NZ - not considered “novel food” by MPI
- Breed once per year in the wild
- Cricket powder is 60-70% protein when dried and processed
- “Complete protein” - all essential amino acids

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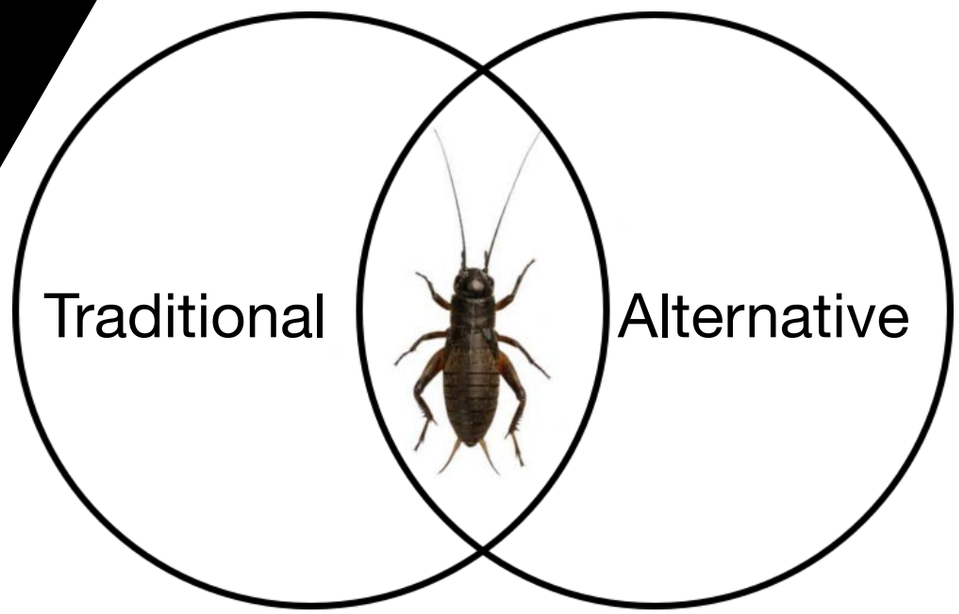
WHERE DO CRICKETS SIT IN THE PROTEIN MIX?



- Traditional or alternative protein?
- Quality of protein vs density
- Cricket is a complete protein
- Flexibility in how we consume it

WILL WE EAT THEM?

- NZ consumers surveyed
- 67% would eat insects
- 50% believed in health benefits
- 70% believed environmental benefits
- Cricket rated #1 preference!

Insects as mini-livestock? A study of New Zealand attitudes toward insect consumption

Penny Payne and Alyssa Ryan

June 2019

REPORT FOR AgResearch

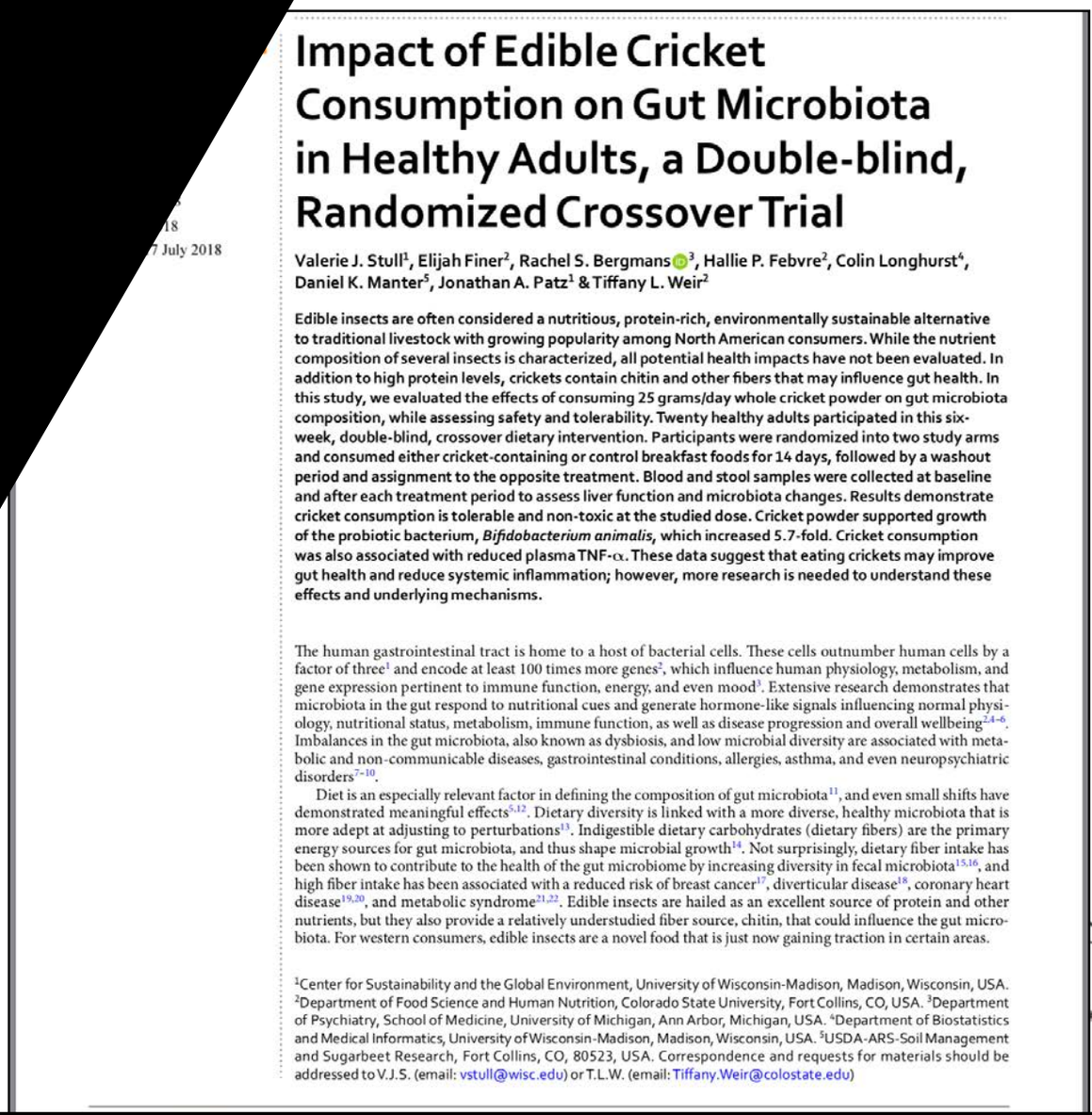
CLIENT REPORT NUMBER: RE450/2019/034

agresearch

ōta mātai, mātai whetū

HIGH VALUE NUTRITION

- High-nutrition “super food”
- First study in the world
- Gut health markers improved
- Inflammatory compounds lowered
- Nutritional qualities of NZ’s teleogryllus commodus look promising



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7 July 2018

Impact of Edible Cricket Consumption on Gut Microbiota in Healthy Adults, a Double-blind, Randomized Crossover Trial

Valerie J. Stull[1], Elijah Finer[2], Rachel S. Bergmans[3], Hallie P. Febvre[2], Colin Longhurst[4], Daniel K. Manter[5], Jonathan A. Patz[1] & Tiffany L. Weir[2]

Edible insects are often considered a nutritious, protein-rich, environmentally sustainable alternative to traditional livestock with growing popularity among North American consumers. While the nutrient composition of several insects is characterized, all potential health impacts have not been evaluated. In addition to high protein levels, crickets contain chitin and other fibers that may influence gut health. In this study, we evaluated the effects of consuming 25 grams/day whole cricket powder on gut microbiota composition, while assessing safety and tolerability. Twenty healthy adults participated in this six-week, double-blind, crossover dietary intervention. Participants were randomized into two study arms and consumed either cricket-containing or control breakfast foods for 14 days, followed by a washout period and assignment to the opposite treatment. Blood and stool samples were collected at baseline and after each treatment period to assess liver function and microbiota changes. Results demonstrate cricket consumption is tolerable and non-toxic at the studied dose. Cricket powder supported growth of the probiotic bacterium, *Bifidobacterium animalis*, which increased 5.7-fold. Cricket consumption was also associated with reduced plasma TNF-α. These data suggest that eating crickets may improve gut health and reduce systemic inflammation; however, more research is needed to understand these effects and underlying mechanisms.

The human gastrointestinal tract is home to a host of bacterial cells. These cells outnumber human cells by a factor of three[1] and encode at least 100 times more genes[2], which influence human physiology, metabolism, and gene expression pertinent to immune function, energy, and even mood[3]. Extensive research demonstrates that microbiota in the gut respond to nutritional cues and generate hormone-like signals influencing normal physiology, nutritional status, metabolism, immune function, as well as disease progression and overall wellbeing[2,4–6]. Imbalances in the gut microbiota, also known as dysbiosis, and low microbial diversity are associated with metabolic and non-communicable diseases, gastrointestinal conditions, allergies, asthma, and even neuropsychiatric disorders[7–10].

Diet is an especially relevant factor in defining the composition of gut microbiota[11], and even small shifts have demonstrated meaningful effects[5,12]. Dietary diversity is linked with a more diverse, healthy microbiota that is more adept at adjusting to perturbations[13]. Indigestible dietary carbohydrates (dietary fibers) are the primary energy sources for gut microbiota, and thus shape microbial growth[14]. Not surprisingly, dietary fiber intake has been shown to contribute to the health of the gut microbiome by increasing diversity in fecal microbiota[15,16], and high fiber intake has been associated with a reduced risk of breast cancer[17], diverticular disease[18], coronary heart disease[19,20], and metabolic syndrome[21,22]. Edible insects are hailed as an excellent source of protein and other nutrients, but they also provide a relatively understudied fiber source, chitin, that could influence the gut microbiota. For western consumers, edible insects are a novel food that is just now gaining traction in certain areas.

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OPPORTUNITY OR THREAT?

bug+lamb new zealand ?

- Green fields industry (with two billion customers)
- Compliment “Clean Green” brand with sustainable products
- Produce high value nutritional “super foods”
- Co-produce with industrial processes - heat, food etc
- Doesn’t compete for farm land or farm labour

FARMING THEM

FARMING THEM

- 6-7 weeks to harvest
- Highly controlled environment
- Relatively easy to manage with good systems
- Fairly hard to kill

THE LAB

- NZ’s first pilot production facility
- Based on modular 40’ container construction
- Produces more protein p/a than a hectare of cows
- Sounds like a Summer night 24/7

WHAT'S NEXT?

- Joint venture to export
- Chitin isolation and refining
- Clinical trials for gut health benefits
- More nutrient-dense products
- More crickets!