Fish Silage in New Zealand Livestock Industries

Jim Gibbs
Rumen Science
Lincoln University
Background

30%+ of NZ fisheries catch processed is a by product not used for human consumption

The raw material is rich in:

1. ‘Healthful’ (omega group) oils
2. High biological value protein
3. Trace elements
Background

- It can be discarded, or used for fish meal production

- Fish meal is a high energy production, complex, unsustainable.
Background

• Fish silage is simply a protein hydrolysis to a flowing fluid state and a pH stabilisation

• Typically done with mineral acids – unsustainable
United Fisheries Fish Silage

• Developed a plant proteolysis process to use very little heating, and no mineral acids.

• The product does not require addition or removal of the raw materials or other components, and has a long shelf life.

• A genuine Kiwi innovation, a significant advance.
Fish Silage - What is it?

Fish carcasses and offcuts

‘Cool’ digestion/ preparation process

Long lasting liquid food source
Fish Silage - What Use Is It?
Fish Silage - What Use Is It?

Growth

Health
United Fisheries Lincoln University Project

Objective:

Trail blaze a path for a fisheries product to be used in NZ primary industries
Fish Silage

The fish silage is rich in:

1. Omega rich oils
2. High biological value protein
3. Trace elements
Fish Silage

The fish silage is rich in:

1. Omega rich oils
   a) Methane suppression
   b) ‘Human health’ value enrichment
Fish Silage

The fish silage is rich in:

1. Omega rich oils
   a) Methane suppression
   b) ‘Human health’ value enrichment

2. High biological value protein
   a) GIT nematode removal
United Fisheries Lincoln University Project

1. Demonstrate that fish silage reduces methane emissions, and show how the product can be practically used in dairy and sheep enterprises.
United Fisheries Lincoln University Project

1. Demonstrate that fish silage reduces methane emissions, and show how the product can be practically used in dairy and sheep enterprises.

2. Demonstrate that fish silage (oils) increase ‘healthy’ fatty acids in dairy cow and sheep milk when used in the feed, and show how the product can be practically used in contemporary dairies.
United Fisheries Lincoln University Project

1. Demonstrate that fish silage reduces methane emissions, and show how the product can be practically used in dairy and sheep enterprises.

2. Demonstrate that fish silage (oils) increase ‘healthy’ fatty acids in dairy cow and sheep milk when used in the feed, and show how the product can be practically used in contemporary dairies.

3. Demonstrate that fish silage (proteins) reduces nematode parasites and show how the product can be practically used in sheep and dairy replacements.
United Fisheries Lincoln University Project

Year 1

Stock safety assessments – the boundaries
Methane reduction trials in chambers
Silage oils in milk in experiments
Nematode reduction in calves and ewes
United Fisheries Lincoln University Project

Year 1

Stock safety assessments – the boundaries
Methane reduction trials in chambers
Silage oils in milk in experiments
Nematode reduction in calves and ewes

Year 2

Silage fish oils in dairy cows (milk) on farm
Nematode reduction trials in calves and lambs on farm
United Fisheries Lincoln University Project

Year 3

Dairy milk fat in sheep
Commercial applications demonstrated on NZ farms:

Milk fat enrichment
Methane reduction
Nematode control dairy replacements
Results

Methane Reduction:

Specialist equipment built for this project.........
Methane Activity

24 hour Cycle

Control
Fish Supplement

Lincoln University
Results

Methane Reduction:

Methane reduction 30% (hay) across groups.
Results

Nematode Reduction

Trial 1 – dairy calves
Trial 2 – lactating ewes
Trial 3 – dairy replacement heifers
Worm Eggs in Faeces (Ewes)

Year 2003
- Supplement
- No supplement

Year 2004
Worm Eggs in Faeces (Calves)
Results

Nematode Reduction

Trial 1 – dairy calves
Trial 2 – lactating ewes
Trial 3 – dairy replacement heifers
Results

Milk fat enhancement (unsaturated:saturated; increased Omega groups; increased EPA & DHA)

Trial 1 – dairy cows, high volume supplementation
Trial 2 – dairy cows, commercial supplementation
Trial 3 – dairy sheep, commercial supplementation
Results

Milk fat enhancement (unsaturated:saturated; increased Omega groups; increased EPA & DHA)

Trial 1 – dairy cows, high volume supplementation
Results

Milk fat enhancement (unsaturated:saturated; increased Omega groups; increased EPA & DHA)

Trial 2 – dairy cows, commercial supplementation
Results

Milk fat enhancement (unsaturated:saturated; increased Omega groups; increased EPA & DHA)

Trial 3 – dairy sheep, commercial supplementation
United Fisheries Lincoln University Project

Summary

Effective, energy efficient process – stable, consistent product
United Fisheries Lincoln University Project

Summary

Effective, energy efficient process – stable, consistent product

Effective in reducing rumen methane emissions
United Fisheries Lincoln University Project

Summary

Effective, energy efficient process – stable, consistent product

Effective in reducing rumen methane emissions

Effective in reducing nematode burdens in cattle on commercial farms
United Fisheries Lincoln University Project

Summary

Effective, energy efficient process – stable, consistent product

Effective in reducing rumen methane emissions

Effective in reducing nematode burdens in cattle on commercial farms

Effective in increasing ‘healthy’ oils in cows and sheep on commercial farms
United Fisheries Lincoln University Project

Project Deliverables

Product confidence – 1st Seafood application for NZ dairy, red meat industries (safe, science based, known outcomes)

Trail to market – dairy cows, sheep

Further Opportunities –
‘organic farms’ (nematodes, trace elements)
‘specialist milk’ production
international applications