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**Optimization and its Applications
in Learning and Industry
(OptALI)**

IRSES

Ongoing Deliverable D1.2

**Description of Research Seminar:
Optimisation of the New Zealand
Dairy Industry**

Start date of the Workpackage: December 2010

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Participants: UGOE
UNIKL
DTU
UOA
UC

Author of deliverable: O. Dowson (odow003@aucklanduni.ac.nz)

Research Seminar

offered by Oscar Dowson (University of Auckland)

in August 2015,

in Kaiserslautern, Germany

Subject: MOO: the Milk Output Optimiser. A Management tool for New Zealand dairy farmers.

Problem: In New Zealand, the dairy industry is the largest export earner, responsible for around a quarter of total goods exports by value. In the 2013/14 season, over 20.5 billion litres of milk were processed from almost five million cows. Therefore, increasing the efficiency and profitability of New Zealand dairy farms will have a large impact on New Zealand's economic performance. A recent development amongst New Zealand farmers is the greater use of supplementation, where farmers purchase additional feed to supplement the herd's diet. Although supplementation leads to greater milk production, the extra capital and labour costs associated with feeding supplements mean that it can be hard to quantify if it increases profitability. Efficient use of this extra supplement is therefore vital to ensuring the maximum financial return. This seminar introduces MOO — the Milk Output Optimiser — an optimisation tool to better manage supplementation.

Main Results: E-Cow, a non-linear system of equations that govern the biological functions of a dairy cow was chosen from the literature to serve as a basis for MOO. We outline how this system of equations was broken down into weekly time periods and formulated as an optimisation problem. Management decision variables of interest to the farmer are the quantity of supplementary feed to allocate the cow each week, and whether to stop milking the cow for the rest of the season. The objective is to maximise profit (value of milk less the cost of supplementation) while

ensuring the cow meets a target Body Condition Score (a proxy for animal health) at the end of the season. By giving some preliminary results, we show that MOO has promise as a useful tool to help farmers make intelligent management decisions, increasing both profitability and animal health.

Participants: Students and researchers at UNIKL