

# System Intensification: Is It Worthwhile?

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Over the last two decades the average dairy farm has significantly intensified its production system through the addition of nitrogen and supplementary feed to increase cow numbers and produce more milk. More recently we have also seen a trend toward capital intensification through investment in off-pasture facilities such as feed pads and wintering barns, and even as far as full robotic systems.

Over this time there has also been intense debate as to whether or not this intensification is a profitable pursuit for the individual farmer and the effect this has on both the reputation and international competitiveness of the industry as a whole.

We will leave industry reputation and competitiveness aside for the purposes of this paper, except to suggest that there is little evidence that the current level of intensification is impacting on these factors.

The purpose of this paper is to look at the intensification decision for the individual farmer – is it right for them? The answer to this question will be different for each farmer depending on their skills and the resources available to them. Rather than try to give a blanket answer (which would be foolish) this paper proposes a framework based of four questions that will assist in the decision making process.

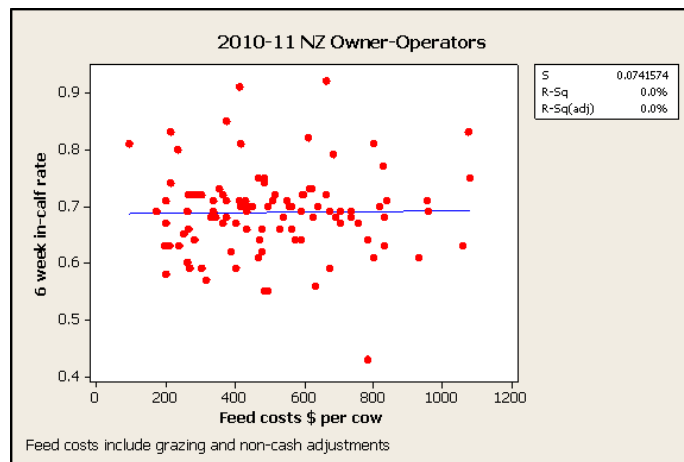
In no particular order those questions are:

1. What is the farmer's goal and will intensification achieve this?
2. What is the financial impact?
3. Has the team got the skills to run the intensified system?
4. How does the risk profile of the business change?

## **1. What is the farmer's goal and will intensification achieve this?**

Farmers will give all sorts of reasons as to why they choose to, or want to intensify their system. Take mating performance as an example; surely increased feeding levels will result in better in calf rates? Data from DairyBase and other individual case studies suggests otherwise. The

scatter graph below shows that there is no correlation between imported feed and 6 week in calf rate.



In a similar vein many farmers are investing in of pasture facilities to “manage environmental impact”, a large part of which is nitrogen leaching. A study carried out for DairyNZ in the Manawatu suggests that farmers tend to intensify their system to cover the cost of the off pasture facility. While leaching may initially reduce, intensification (importing more nutrient and adding more cows) results in N leaching returning to prior levels, counteracting any initial benefits gained.

Scenario	N-Loss (kgN/ha)
Base – No grazing off	29
Base – Grazing off	27
Housing – Base production (350 kgMS/cow & 950kgMS/ha)	19
Housing – Moderate intensification (400kgMS/cow & 1,300kgMS/ha)	23
Housing – High intensification (500kgMS/cow & 1630kgMS/ha)	27

**So What?** Farmers shouldn't change their system expecting to resolve performance issues – the interactions are complicated and they need to be sure they are targeting the right issues.

## 2. What's the financial impact?

Intensification generally requires investment in the farm system, whether it's through buying cows, shares, feed pads or building a housing facility. That investment then generates cash flows over time and has a residual value that can be realised (sold). How the financial impact is judged is dependent on the decision criteria used by the farmer to decide whether or not they will invest. A range of criteria should be used and may include:

- Ability to **cash flow** the system
- **Operating profit**
- **Return on asset**, or;
- **Return on investment**

In many cases the farmer will be able to cash flow the intensification project because of low debt levels and good operating profit. Being able to cash flow it is an important measure for the bank as it will encourage them to lend money but it's not a good measure of financial impact as it does not separate out the returns from the investment relative to the cost.

Operating profit is a good measure of whether or not the farmer makes a greater annual profit from the new system, and combined with asset values you can calculate return on assets. This provides a measure of efficiency as to how well your assets are employed to generate profit, however it is a one off snapshot of the business and doesn't take into account the time value of the investment.

Investment in capital assets generates a pattern of cash flow over time that is attributable to that investment and the pattern of that cash flow is not always even, for example a housing facility may need a roof replaced. The implication of that is that while an investment may look good in year 1 the performance over the life of the investment can be less certain. To account for this, farmers and their advisors need to use tools such as net present value (NPV) or internal rate of return (IRR) to judge the merits of the investment.

In very simple terms NPV shows you what the future cash flows from your investment might generate in today's dollars, while IRR returns what you might call the effective interest rate for that investment.

When these measures are used as decision making criteria they will often give very different answers as is illustrated in the table below. This case considers making an investment to move from a low to a high input system in Canterbury.

<b>Measure (Decision Making Criteria)</b>	<b>Results of Investment In a High Input System in Canterbury</b>
Operating Profit / Ha	\$498
Return On Asset	0.2%
Internal Rate of Return	4.6%
Net Present Value / Ha	<b>-\$891</b>

Results:

- In this case both operating profit and return on assets show positive increases. This would suggest that the system change is worthwhile and the farmer should go ahead with the investment.
- IRR suggests the “interest rate” the farmer is getting on this investment is only 4.6%. If the farmer had to borrow the money to invest or thought the cash flows were quite risky is 4.6% enough to cover the cost of investment?
- The NPV suggests that the project will deliver a negative return over time once the cost of capital is considered. This means the farmer should not go ahead with the investment.

When the cash flow is considered over time, using either the NPV or IRR methods the investment appears far less attractive than might initially be the case. This is due to relatively small cash flows compared to the investment and a lot of uncertainty about the future value of the investment. There is certainly a sense that a farm can become over capitalised and the market is unwilling to pay full value for capital invested above the “average” required on farm.

**A couple of caveats:**

*Analysis must be farm specific*

There are no shortcuts to the decision making process, each farm has unique resources available to them and each farm owner is prepared to operate with different constraints. Therefore the assumptions used can be quite different, although they should be backed by research where possible and be very questioning of claims made by salesmen. As a result what might be an unprofitable investment in system intensification for one person may be profitable for another.

### *Eyes wide open*

It is critical to note that farmers have different values and drivers and will make investment decisions for reasons other than maximising profit. They may intensify to maximise per cow production for the challenge of doing it, or just to keep up with the Jones'. Whatever the motivation it is important that the financial implications are well understood and that the farmer makes a conscious decision to invest in a scheme that may not yield a positive monetary return.

**So What:** It is critical to use the right analytical tools to assist with decision making and to get sound advice, preferably backed by research, to support the assumptions used in the analysis.

### **3. Has the team got the skills to run an intensified system?**

Typically DairyNZ will tell farmers that it doesn't matter what system you run, each of them will provide a similar return on assets. There is an unspoken caveat in this statement: it assumes good management practice! What happens if the manager is not so hot?

Analysis suggests that as systems get more intensive it is more important to have good managers in place. This is illustrated in the graph below, which shows that under poor management in the Waikato a low input system is more likely to be profitable than a high input system under the same management. This holds true across other regions as well.

At a really simplistic level the reason for this is the number of additional factors that need to be managed. An increased number of decisions required compounds the impact of decision error and magnifies risk. For example what happens if a farmer gets a decision 5% wrong each time?

Making 2 decisions:  $0.95 \times 0.95 = \mathbf{90\% \text{ of the result}}$

But making 4 decisions:  $0.95 \times 0.95 \times 0.95 \times 0.95 = \mathbf{81\% \text{ of the result}}$

In a high input system the farmer has more decisions to make and more room for error. Just in terms of feeding they need to manage pasture well, source supplement of the right quality at the right time and at the right price, manage wastage and integrate it into the system to avoid substitution. Add in the challenges of managing health and welfare in a barn and maintaining

repairs and maintenance costs with additional machinery movements and it is clear there is room for error!

How can management capability be assessed? Some ideas on what good managers are known to do are listed below. A farmer will fit in this group if they:

- Have realistic view of own ability
- Have a plan
- Benchmark themselves
- Retain and grow staff
- Can analyse business and adjust to changing circumstances
- Don't let the small stuff slide
- Engage in continuous learning
- Are well networked
- Negotiate well
- Budget and monitor
- Manage risk and don't just respond.

**So What:** Farmers need to be realistic about their ability as it will have a significant impact on the success of system intensification.

#### **4. How does the risk profile of the business change?**

The risk profile of the business changes as intensification occurs, it may not be better or worse, just different. For example a low input system is more at risk of hitting low body condition scores than a high input system, but a low input system's profitability is not dependent on the price of feed!

Some sources of risk in intensification

- Sustainability – especially N leaching
- Availability of water
- Animal welfare
- Management capability
- Quality, availability and price of feed
- Operating profit margin

One area of risk worth highlighting is environmental risk and the drive for people to invest in off pasture facilities such as housing. The possibility of intensification counteracting the benefits of housing has already been highlighted as one area of risk. A further area of risk is in being the first mover. There is the possibility that as environmental regulation develops the solution that is installed today may not meet the requirements of regulation when it is enacted in the future. It is important that decisions are well informed, especially when significant capital is involved.

**So What?** It's important to evaluate risk and determine farmer tolerance of the changing nature of risk as the farm intensifies.

## **Conclusion**

Under good management, any system can provide a similar return on asset, which is the best indicator to judge the efficiency of your operation. However, when considering investing significant amounts of capital operating profit and return on asset do not tell the whole story!

Farmers should also consider:

- The return on capital invested over time
- The change in risk profile that a system change brings to the farm
- The capability of the farm team to manage the new system

### **How to decide to change system?**

- Understand the goals of both the farming family and the farm business as a foundation for decision making.
- Be sure that the new system is implemented for the right reasons and that it will also deliver on the goals above.
- Treat it as an investment decision and understand the long term implications. It's critical to use the right tools, so get help from a professional to do this.
- Be honest about management capability within the farm team and make sure the system is designed to fit the team.
- Understand the changing risks that the business is exposed to and be comfortable that they can be managed.

Finally, just because it doesn't stack up financially doesn't mean the farmer shouldn't do it.

Because farmers have different values and drivers they may not always be seeking to maximise profit. However they should understand the opportunity cost and make an informed decision to proceed acknowledging this cost. Eyes wide open!