As margins tighten – can you afford to 'fly blind'?

Dr PANOS VARVARIGOS * offers a computerised solution to keeping in immediate touch with farm inputs and production planning which – at relatively low cost – could have a big impact on profitability

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Computerisation relieves the burden of data collection and storage and eases decision-making by providing all necessary information on time. The manager may know at a few keypresses which batch of fish is growing in which pond, and how well they are performing.

Input waste and any abnormal condition of the fish can be quickly detected and rectified, thus realising considerable savings.

AS salmon farming enters a phase of "re-structuring" which will allow only efficient, quality producers to prosper, the role of computerisation tends to strengthen. With falling prices marketing priorities shift to satisfying the consumer rather than filling a supply gap. Up-to-date information becomes vital for cost-conscious managers who must satisfy the markets and simultaneously reduce production costs.

Efficient use of resources means less input cost per unit of output and a microcomputer on the farm could have a big impact on profitability by readily reporting crucial facts, such as stock status and valuations, feed use and requirements, growth projections and so on. How could an alarming drop in food conversion be communicated clearer than by an instantaneous inspection of a graph on the computer's screen?

Programming growth

The major input, and hence production cost, is feed. Therefore, during a production cycle from fingerlings to table fish, optimum growth per kg of feed is desirable. Optimum growth for profit is not necessarily coincident with the fastest growth.

For a given set of environmental conditions – mainly water temperature – the rate at which food is converted to fish flesh changes as the food consumed moves from maintenance (no growth) to satiation levels (maximum growth). Between these extremes there is an optimum feeding level where the conversion rate is maximised (figure 1). This is the feeding level for the most efficient growth where the best utilisation of food occurs. Beyond this level, and until satiation, growth continues to rise, but with declining efficiency. In other words the FCR worsens (figure 2).

You are feeding economically only within the bounds of optimum and satiation levels.

The precise level of "economical feeding" depends on the marketing targets; stocks may need to be adjusted to market demand by restricting feed and reducing growth below the potential maximum. Feed regulation can prove very effective in programming growth and achieving the right average fish weight.

Feeding charts supplied by feed manufacturers to indicate daily food intake usually point at an intermediate feeding rate which allows for reasonable growth, i.e., somewhere between optimum and satiation levels. These tables are averages, however, produced under conditions which may not identify a particular farm and with no specific production target in mind.

A microcomputer, on the other hand, can store records and show results tuned precisely to its own farm's environment and style of stock management. The first step is to gather records of food, growth and environment, which will facilitate the analysis of production affairs and growth predictions thereafter.

Automatic grading equipment, combined with fish transfer pumps or elevators and counting machines, is already in use on many farms. Apart from alleviating the burden of otherwise labour-intensive tasks, automation readily provides precise fish numbers and sizes in all pens.

Consistent data collected from a few pens at satiation feeding will soon reveal the maximum growth for any one batch of fish in all seasons. Subsequently, several reduced feeding levels may be applied. Recording these observations over a few years will build an invaluable data base. The computer will query this data base and identify the best production plans. Seasonal fluctuations can be exploited and sales may be spread in the year.

Reducing waste

Having done the planning, a continuous check on production is necessary. The computer can run checks of anticipated versus actual performance and identity discrepancies. These may be due to unforeseen environmental change, such as sharp temperature fluctuations, or management errors like overstocking, or erratic feeding resulting in food waste.

Unfortunately, no farmer can ever be certain that all supplied feed is eaten or that all fish in a pond or pen have attained a similar feeding level. Feeding cannot be perfect, but consistent data on growth, mortalities, water temperatures and feed will depict problems. Worsening FCR figures lead the manager, having checked on mortalities or environmental extremes, to examine the feeding policy before blaming the fish.

Computers, programmes, costs

Sound data records are invaluable for good decisions but very hard to organise. Manual systems are frequently abandoned because of the excessive time and effort required to keep them up to date.

An on-farm microcomputer will record and store the fish farm's data in an orderly fashion. Subsequently, the data base will be analysed for the provision of suitably-presented reports or plans. Data is processed fast, error-free, and there is no limit to querying or recalculations.

The costs of computerisation can be distinguished into system development, running costs, and depreciation which is accounted here as a sinking fund (table 1).

Development costs predominate and comprise the purchase of hardware – microcomputer and printer – and the acquisition, installation and testing of software programmes.

There is ample choice of computers and software packages on the market. In order to match the needs of the individual business, however, customisation of these programmes is necessary. With the co-operation of the manager, the programmes should be fine-tuned to suit the exact needs for data storage, reports and forecasts with agreed contents and layout. The ability of the most popular packages to be tailored avoids expensive programming and ensures a very cost-effective system.

A microcomputer with sufficient processing power, fixed disk, and compatible with the most popular operating system can be bought at the average price of £1,000. A reasonable text and colour graphics printer will cost an additional £250. An off-the-shelf spreadsheet or data-base package will cost approximately £500. With the exclusion of consultancy fees to customise and test the software, the development cost rises to £1,750.

Running costs include annual equipment maintenance and insurance, which at 12 per cent of their value will be £150, and consumable items (electricity, diskettes, paper and printer ribbons) approximately £100 per annum. Thus, a total annual estimate for running costs averages £250.

In practice, to cater for expansion or amendments of the programmes, a flat annual maintenance fee (perhaps 10 per cent of the initial consultancy fee) may be added when budgeting for the system.

Assuming zero terminal value of the hardware, and a five-year write off period due to obsolescence, depreciation will be £250 per annum.

Appraising the investment

The computerised system should be capable of offering a return which at least breaks even with the investment and running costs. Moreover, for safety, it should facilitate hardware replacement at the end of the investment period.

Table 1 shows a conservative calculation which accounts simultaneously for the development cost and a sinking fund allowing free replacement of the computer equipment at the end of a five-year investment period whence equipment is assumed obsolete with no salvage value.

These hypotheses show that a marginally acceptable system should generate an annual cost saving of just £850; or 2 tons of feed.

Naturally, besides time and input savings, there are non-quantifiable benefits expressed by an intrinsic satisfaction to manage more confidently. Computers, however, enhance but do not introduce management efficiency; they support, but do not make, decisions.

Table 1: Expected capital outflows and marginal inflows for a fish farm computer system

	OUTFLOWS			INFLOWS	
years	development cost*	running cost**	sinking fund	terminal value	break even return
1	–1,750	–250	–250		850
2		–250	–250		850
3		–250	–250		850
4		–250	–250		850
5		–250	–250	0	850
Totals	–1,750	–1,250	–1,250	0	4,250
Break even totals			–4,250		4,250

*excluding fees for software customisation.
**excluding software maintenance.

Figures 1&2: A general sketch of consumed food vs. growth rate at constant temperature and other conditions.

F: food. G: growth. FCR: food conversion ratio (= F/G)

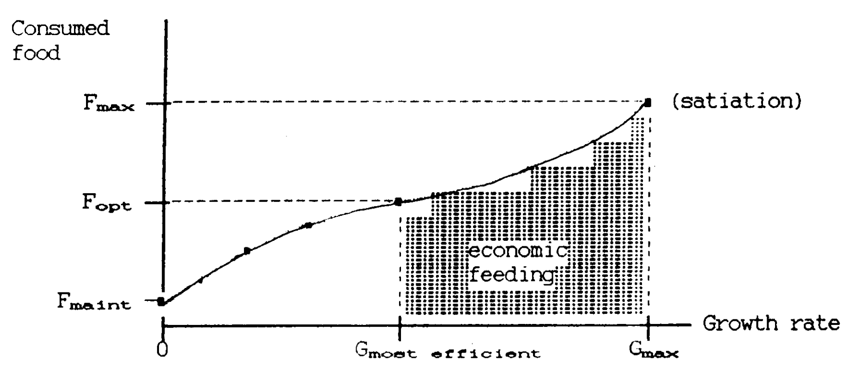

Figure 1

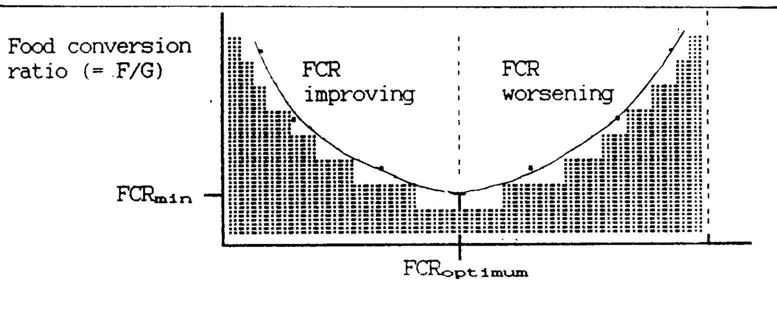

Figure 2