

Application of Electronic Management Tools

Marvin Salomons (workshop facilitator)

Alberta Agriculture Food & Rural Development, #301, 4920 – 51st, Red Deer, AB T4N 6K8

E-mail: marvin.salomons@agric.gov.ab.ca

Technological advances have made computer programs and electronic equipment standard management tools in many swine operations. This workshop will demonstrate several innovative computer programs and electronic technologies that are available to the pork industry. In the workshop participants will learn how to calculate heating and ventilation requirements for pigs using the *Canadian Livestock Ventilation Analysis (CLVA)* program. Participants will use *Bezova* to determine pig comfort zones. You will also gain an understanding of financial analysis and planning using the latest version of the Excel spreadsheet based *Pork Production Financial Analysis System*. In the workshop participants will also use the *MARC98* manure management software to assist in nutrient management decisions, and learn how to operate *Real-Time Ultrasound (RTU)* equipment to test backfat levels and do pregnancy diagnosis in pigs.

▪ Tools for Calculating Heat and Ventilation

Robert Borg

Alberta Agriculture Food & Rural Development, #301, 4920 - 51st, Red Deer, AB T4N 6K8

E-mail: robert.borg@agric.gov.ab.ca

Introduction

Good ventilation and heating systems are essential for several reasons:

- Worker health and productivity is closely related to working conditions inside barns.
- Air quality is based on reasonable levels of dust and gases such as carbon dioxide and ammonia.

- Dust in barns is organic in nature and interacts with human physiological systems leading to allergies, bronchitis, occupational asthma and organic dust toxic syndromes if levels are too high.

Animal production along with animal welfare is improved by having good environmental conditions in the barn. Productivity is improved with good control of temperature within an animal's comfort zone and with good ventilation that keeps manure gases, dust, and relative humidity under control.

Ventilation performance specifications are important for good barn design. A standard ventilation calculation will allow comparisons between alternate systems for cost and performance. Standard ventilation calculations are also useful for barn commissioning purposes, the final adjustment and calibration of equipment that is necessary before animals occupy the barn.

Life cycle costs can be lowered with good environmental design. A barn that costs \$5000 per sow place will save \$4 - \$5 per pig marketed if it has a 25-year life expectancy instead of 15 years as a result of poor maintenance and ventilation.

CLVA

CLVA (Canadian Livestock Ventilation Analysis) is a computer program (developed by Peter Clark, Alberta) that uses the latest research values for heat, moisture, and carbon dioxide production of livestock to calculate the heat and ventilation requirements of barns housing pigs, dairy, poultry, cattle, horses, sheep, or goats. Features of the program are the ability to predict air flow for different room temperatures, humidity levels, and carbon dioxide concentrations. The program will allow for sophisticated wall and roof designs and building geometry. *CLVA* will do annual energy audits, will allow for preheat hallways, common walls, heat exchangers, evaporative coolers, wind effects on buildings, effects of ground temperatures, and will consider controller characteristics (P bands for heat and ventilation).

BEZOVA

BEZOVA is a program from Holland that calculates the comfort zone of pigs as well as their upper and lower critical temperatures. The program allows you to consider the effects of room temperature, body temperature, feed intake per pig, floor type, number of pigs in the pen, and air speed at animal level. *BEZOVA* also calculates the total heat loss of each pig.

RCDUCTS

RCDUCTS is a program developed by Alberta Agriculture that calculates the hole number, diameter, and hole spacing for air re-circulation ducts as well as fan requirements. It will calculate the performance of round and square ducts and will allow for equal hole spacing, variable hole spacing, and tapered ducts.

Re-circulation ducts are used to provide the energy for air mixing in a room without creating drafts on the pigs. Re-circulation can also be used to create an air curtain that prevents cold air from fresh air inlets from dropping directly on to the pigs.

NATVENT

NATVENT is a program for calculating door and chimney sizing for naturally ventilated buildings. It was developed in Ontario and uses the most sophisticated research data available to calculate air volumes based on 30 years of weather data from stations across Canada. *NATVENT* predicts ventilation for various building geometries and building orientations. Natural ventilation in a finisher barn will save nearly \$1 per pig finished because of lower electrical costs to run the ventilation system.

PITVENT

PITVENT is a program developed in Québec that will predict the performance of manure pit ventilation exhaust air ducts. *PITVENT* calculates hole sizing and spacing for rectangular and circular exhaust ducts

▪ **Pork Production Financial Analysis System**

Al Theede

Pharmacia & Upjohn Animal Health, 183 Dore Cres, Saskatoon, SK S7K 4X6;
E-mail: theede@dlcwest.com

The Pork Production Financial Analysis System is a series of computer spreadsheet templates used to perform financial analysis, financial planning, simulation modelling and to provide proforma financial statements for pig production units. The computer models, which are created, have the flexibility to simulate many different farm situations. They can be used to calculate proforma financial statements and to perform sensitivity analysis on a variety of production factors, input variables and market price situations. These spreadsheets are a useful tool for calculating the cost of production and for developing budgets and projections for both new and expansion farm projects. The models are used to help understand the economic and financial returns of a pig production enterprise.

Financial institutions, investors and partners increasingly require detailed financial projections and plans to support their participation in farm business operations and projects. This workshop breakout session will demonstrate Microsoft Excel Office '97 spreadsheet models that assist with this analysis and planning. This system has used by many Western Canada and U.S. production

systems and individual farms. There are two basic analytical and planning systems: one for sow production units and another for nursery and/or finishing units. There are 1-year, 10-year and Scenario Comparison models for sow production systems and for nursery/finishing units. There is also a 10-year model for the expansion of a sow production unit.

Sow Production Models

The Sow Production system models are used to model or simulate sow breeding, gestation and farrowing units. Pigs can be raised to finish (slaughter) weight, sold out as feeder pigs or sold as iso-wean pigs (weaned and removed from the sow unit). The 1-year model creates 1-year proforma Net Income and Cash Flow Statements, a feed cost and use summary table, a summary of production information and financial ratios, and several sensitivity tables and graphs based on major input parameters. The 10-year model creates a set of 10-year proforma Financial Statements, a 104-week cash flow statement over the first year start-up period, a summary of production information and financial ratios, and a market price and grain price sensitivity table and graph across the 10 years.

Nursery and Finishing Models

The Nursery and Finishing spreadsheet templates are used to model finishing or nursery pig production systems. The models use an incoming, start weight and an ending or market weight. They can be used for iso-wean to slaughter weight finishing production, feeder to finish production or nursery (wean to feeder) units. The 1-year and 10-year models develop similar calculations, tables and graphs as the sow unit models.

The Workshop Session will demonstrate using the spreadsheet models to analyse and/or plan for financial implications of the following farm production situations:

- Calculate the Cost of Production in a farrow to finish sow herd, including sensitivities for different market return prices.
- Create a set of proforma financial statements, including a start-up cashflow statement for a new sow to feeder pig production project.
- Estimate the financial impact of a production decision such as using Artificial insemination.
- Calculating the appropriate price to pay for feeder pigs entering a finishing unit.

Further information and a copy of the models can be obtained from AI Theede.

▪ **MARC98**

Sylvio Tessier

Manitoba Agriculture, #204 545 Univ. Cres., Winnipeg, MB R3T 5S6
E-mail: stessier@agr.gov.mb.ca

Software Features

MARC98 is a livestock manure management planning tool designed to help producers calculate application rates of livestock manure. It has been developed by Manitoba Agriculture, with the financial assistance of Manitoba Pork. *MARC98* integrates all of the extension information and worksheets developed by Manitoba Agriculture to match livestock manure application rates to crop nutrient needs. A data base brings together average values for most livestock production systems (solid and liquid manure, from swine, poultry, horses, etc.) and the data from the "Guide to Soil Fertility and Fertilizer Use in Manitoba".

MARC98 is essentially a crop nutrient budget calculator coupled with an overall farm management component allowing for a field by field calculation of manure application rates. The software is a simple menu driven program prompting the user to provide the essential information for the farm and each of the fields where manure is to be applied. The producer only has to gather soil test and manure nutrient analysis reports and think about cropping intentions to design a plan. After entering the appropriate information to identify the operation, a producer can enter the total volume of manure to manage and go through the menus to "distribute" this volume on up to 10 fields and crops. *MARC98* will even adjust application rate on the basis of time of application and application equipment, to ensure that crop needs are met.

Record Keeping Features

MARC98 prints general farm information data (location, manure type, manure analysis, etc...) as well as a field by field information on cropping plans, rate of application (gallons or tons/ac, L or tons/ha and applied NPK). The program also calculates the speed at which the operator needs to drive the tractor or truck to achieve the target application rate. A volume summary sheet completes the package, showing where and how much of the manure is to be applied. Producers can keep track of yearly manure management simply by having a file containing the farm information, volume summary and manure nutrient analyses combined with field information and soil tests in individual files for each of the fields receiving manure.

MARC98 Calculates Manure Value

MARC98 calculates the actual value of each of the nutrients applied with the manure and deducts this from the cost of application allowing the producer to calculate savings in commercial fertilizer application. This information can be used to show the value of manure to neighbors willing to use it in their crop management program.

MARC98 Integrated With Manure Management Regulations

The most important sections of the Manure Management Plan registration (Manitoba Environment Form MR42/98) have been integrated in *MARC98*. Producers can translate the information from detailed manure management plans onto a form approved by Manitoba Environment. The program assists large intensive livestock producers, as required in provinces like Manitoba, to file yearly manure management plans prior to land application of livestock manure.

Sources for MARC98

MARC98 is available on the Internet at Manitoba Agriculture's web site. The software and the user manual can be downloaded free of charge from this site: www.gov.mb.ca/agriculture/livestock. Alternatively, a hard copy of the user manual and a CD (or diskettes) containing the software can be ordered directly from Manitoba Agriculture. A Pentium type computer with Windows 95 or NT is required to run *MARC98*.

▪ Using Real-Time Ultrasound to Improve Efficiency in the Breeding Herd

Heather Willis¹ and Michelle Follenesbee²

¹Alberta Pork Research Centre, 9th Flr, O.S. Longman Bldg, 6909 116 St, Edmonton, AB T6H 4P2, *Email:* heather.willis@agric.gov.ab.ca

²Alberta Agriculture Food & Rural Development, #204 J.G. O'Donoghue Bldg, 7000 113 St, Edmonton, AB T6H 5T6, *Email:* michelle.follenesbee@agric.gov.ab.ca

There is growing interest in the swine industry regarding the use of Real-Time Ultrasound (RTU; also known as B-mode) for pregnancy diagnosis and reproductive diagnostics in the breeding herd and for the measurement of backfat and loin depth in the grower/finisher population. However, the measurement of backfat in the breeding herd can also be utilized to tailor feeding programs to maximize reproductive performance.

Pregnancy Diagnosis

Pregnancy diagnosis can be accomplished using either the Doppler or A-mode types of ultrasound equipment or the newer technology of RTU. In this workshop we will be discussing how each type of machine functions to diagnose pregnancy, and as well, the benefits and disadvantages associated with each machine's use. Briefly, both Doppler and A-mode ultrasound can be used from 28 to 35 days of pregnancy but may require multiple tests to confirm pregnancy, whereas RTU can be used as early as 21 days of gestation to confirm pregnancy with a single test. This allows earlier identification of open animals which could result in the reduction of non-productive days which may increase farrowing rate. A further reduction in non-productive days is associated with the accurate identification of late-term non-pregnant animals (irregulars or 'drop-outs'). The main drawback to RTU technology is that it may be cost prohibitive for some farms. Recent estimates suggest that a minimum of 500 sows are needed for RTU to be cost-effective. Participants in this workshop will be provided with an economic analysis for using RTU for pregnancy detection. Pregnancy detection using RTU will also be demonstrated.

Backfat and Loin Measurement

As well as pregnancy detection, RTU technology can be used to accurately measure sow backfat levels. A recent article ^(a) by Dr. Frank Aherne concludes that visual condition scoring is not an accurate predictor of a sows fatness. To best manage a sows condition and to correctly manage their feed intake, the employment of some form of ultrasound is desirable. If a producer has invested in RTU for pregnancy diagnosis, a further investment for the purchase of a linear probe will also allow backfat and loin measurements to be taken. This workshop will feature a discussion on the benefits of measuring sow backfat levels and a demonstration of technologies, such as RTU, used to measure backfat levels in breeding animals.

^(a) Aherne, F.X. *The effectiveness of condition scoring. In: Revealing Research, Summer 1999, pp.2-4.*