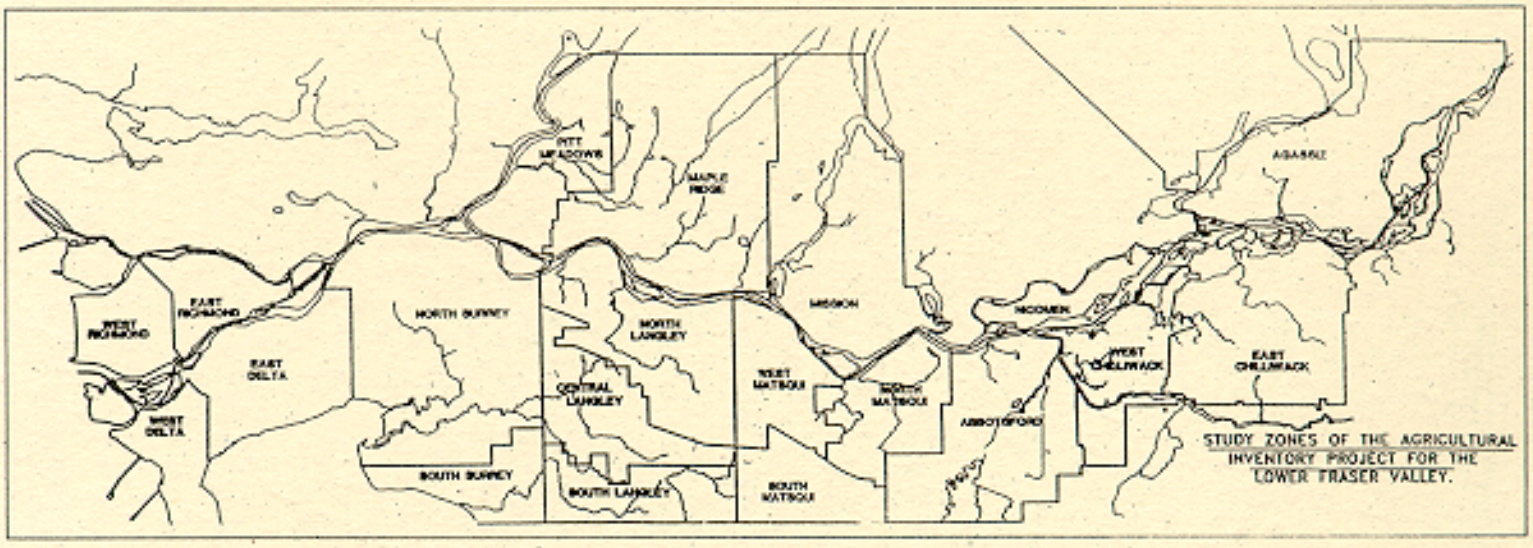
PRODUCER WORKSHOP PROCEEDINGS



Component Project
of
Management of Livestock and Poultry Manures in the Lower Fraser Valley

REPORT 7

DOE FRAP 1996-28

Environment Canada — Environnement Canada
FRASER RIVER ACTION PLAN — PLAN D'ACTION DU FRASER

Fisheries and Oceans — Pêches et Océans
FRASER RIVER ACTION PLAN — PLAN D'ACTION DU FRASER

Ministry of Environment, Lands and Parks

Ministry of Agriculture, Fisheries and Food

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Prepared for:

BC Ministry of Environment, Lands and Parks

Environment Canada, Fraser River Action Plan

BC Ministry of Agriculture, Fisheries and Food

Fisheries and Oceans, Fraser River Action Plan

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April 1996

Disclaimer

This report contains the results of a project conducted under contract. The ideas andThe opinions expressed herein do not necessarily state or reflect those of the participating parties.

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APPENDICES

1.0 INTRODUCTION

This report presents the proceedings of a producer oriented workshop conducted as part of the "Management of Agricultural Wastes in the Lower Fraser Valley" program.

The goal of this program is to evaluate the production, treatment and disposal of agricultural wastes, primarily manure, and present a background against which policies and strategies for improving nutrient (manure and inorganic fertilizers) management can be developed.

The program has been broken into several component projects which address three general questions:

- what is the current state of agricultural nutrient management
- what are the practical options for improving nutrient management; and
- how might the various practical options be implemented.

Reports for projects which have been completed or are in progress under the program include:

- Agricultural Inventory of the Lower Fraser Valley - Data Summary Report (Brisbin,1994)

- Application of Inorganic Fertilizers in the Lower Fraser Valley (Brisbin,1995)

- Agricultural Nutrient Pathways (Brisbin and Runka,1995)

- Livestock Waste Management Practices and Legislation Outside British Columbia (Runka,1995)

There are several recent and on-going projects addressing various components of nutrient management in the Lower Fraser Valley . The program has attempted to utilize existing information and reports as much as possible. The program has also relied heavily on consultation workshops and interviews with technical specialists, an approach which has proven to be very productive.

In order to obtain feedback from producers a workshop was held in Abbotsford on February 28, 1996. The objective of the workshop was to present an outline of Lower Fraser Valley nutrient management and related problems to producers, and to solicit their comments on the current state of agriculture's environmental performance and on possible options for improvements.

Invitations to the workshop were sent, by the BC Ministry of Environment, Lands and Parks (BCMELP), to several producer groups. A list of those receiving invitations and the information which accompanied the invitations is contained in Appendix A.

Prior to the workshop groups and individuals who had indicated they might attend received a draft of the program Interim Summary Report. This report and a list of those who received a copy are contained Appendix B.

The workshop format is described in Chapter 2. Comments from workshop participants are presented in Chapter 3 and Chapter 4 contains an interpretation of the questionnaire answers and comments.

2.0 WORKSHOP FORMAT

The morning session of the workshop consisted of several presentations on agricultural nutrient management in the Lower Fraser Valley. The workshop agenda and abstracts of the technical presentations are contained in Appendix C.

The afternoon session was devoted to group discussions. Producers, producer group representatives and agency representatives were split into five discussion groups. A questionnaire, developed by the program Steering Committee, was used as a framework for the discussions. Ron Bertrand (BCMAFF), Jennifer Nener (DFO), Rick Van Kleeck (BCMAFF), John Paul (Agriculture and Agri-Food Canada) and George Derksen (Environment Canada) acted as facilitators for the discussion groups.

The questionnaire was used to focus discussions and is reprinted in Appendix D. Workshop participants who took part in the group discussions are listed in Appendix E.

3.0 WORKSHOP QUESTIONNAIRE RESULTS

The questionnaire response summaries include only those responses made by producers. Questionnaire responses are presented in the graphs which appear in Figures 1 to 5 in Chapter 4 of this report. Responses given by producer group representatives or agency representatives are not included in these graphical summaries.

The agree category on the graphs include "agree" and "strongly agree" responses made on the questionnaire, the disagree category includes "disagree" and "strongly disagree" responses and the don't know category includes the "unsure" responses plus no response at all.

Comments made on the questionnaire are reprinted in the following section. All comments have been included, those made by producers as well as those made by producer group and agency representatives. In most cases the comments have been reprinted as submitted, however, some minor editing has been done to improve readability. Any editing changes are noted by square brackets, [ ].

Section 3.2 presents comments provided by group facilitators summarizing feedback they received from workshop participants and Section 3.3 presents other comments noted during the workshop.

3.1 SUMMARY OF QUESTIONNAIRE ANSWERS AND COMMENTS

3.1.1 Section A - General

1) The following type of pollution is occurring in agricultural areas:

- **1a) AIR**
- **1b) WATER**
- **1c) SOIL**

2) Agriculture is an important contributor to pollution:

- **2a) in all areas of the Lower Fraser Valley**
- **2b) certain areas of the Fraser Valley**

3) Agriculture will need to do more than it is currently doing if environmental problems are to be resolved.

4) Sustainable agri-food systems are "those that are economically viable, and meet society's need for safe and nutritious food, while conserving or enhancing natural resources and the quality of the environment for future generations.

1b. Some areas are a problem.

I see there are certain hotspots that are trouble areas but these are localized. I see there are localized problems.

All pollution, air, water and soil, are localized and cannot be answered by generating an answer to (1). (4) must also be economical for returns on investment.

Air pollution also comes from the cities.

The economics have to be considered in all changes made.

The data has been emphasized to prove a point rather than present facts as realistically as possible; i.e. Phase II groundwater program showed water quality in general is good - 10% above Cdn standard on nitrate levels - this is not a common pollution problem. Let's evaluate the items realistically = practically.

I am unaware of air pollution. If soil is polluted by over application it is easily corrected by not fertilizing for some period of time.

More has to be done with respect to agricultural practices, but not wholly by agriculture. A significant fraction of environmental costs associated with agriculture need to be borne by a larger fraction of the population. "Economically viable" can and should include financial assistance from government to achieve environmental desires.

All of society has to pay to enhance natural resources and quality of environment. Some control has to be on US and cross border food.

It must be that farmers can make a living at their trade. This is best done by the farmer getting a fair price for his or her product. This must be done by controlling the influx of cheap food that doesn't have the same environmental regulations.

Keep in mind that sustainable means "economically viable" when meeting this criteria. Hot spots are most important to deal with, this is in keeping with US regulation.

It is recognized that the farmer might not be able to afford the full cost of management practices. In addition to agriculture there may be other sources contributing to nitrogen emissions to air, water and soil.

Economically viable for who? - for producers and for future generations of producers. With supply management people were paying a "fair price" and the industry did not need subsidies. How much of "enhancing natural resources" should lie with producers or society.

Yes, but maybe urban consumers should make it more viable.

Legislation or education. Consumer education needed. Industry needs protection, feeling is that government doesn't care.

Good data base to show water quality is deteriorating. Education, but will it really matter, people don't really care, politicians won't do.

3.1.2 Section B - Stabilization

5) To keep problems from getting worse, all new or expanding farms first need to demonstrate they are sustainable.

I would say if it is a hot spot it might be necessary but as a general rule it would be too restricting. My concern would be who determines viability and within what constraints.

But to who will this presentation be to? Is this person qualified to make decisions for you. If required only in hot spots.

If the farms are not sustainable they will not be in business very long with the low returns.

Economics first or farms will not exist.

To be OK'd by producer groups, not by permit.

Plans need to be measurable and enforceable. First step of approval should be by own commodity (peer inspectors).

"Right to Farm" legislation should include some direction and authority to have an approval system for agricultural waste management systems on new operations and agricultural sustainability should be the sole responsibility of the Ag Ministry using best available environmental data.

But the degree of work involved in providing this demonstration will vary from region to region, in accordance with soil conditions, aquifer type etc.

I don't know how it should go. If I don't receive enough money to make improvements, I can't make them. New farms should be approved for their area.

But this cannot be seen as an agreement to regulate. The BAWMP is an excellent tool, all farms should be BAWMP'd over a few years but the cost must be recoverable.

Your questions are all loaded and difficult to answer for reasons I am not sure where they are going. Anything that will be answered can be taken completely out of context by certain answers. I believe in the poultry industry we are sustainable because of ongoing manure removal. But there has been a cost to that for the industry. Two points in eggs in 20 years: 20% cutback per farm, better feed conversion for eggs produced. BAWMPs are effective.

What does this mean? Sustainability is a fluctuating concept.

Economic and environmental sustainability may not be compatible.

Hate to go to permit system. Left up to the individual to manage properly. Should live up to the Code. Should sustain what they have, there should be rules about nutrient management. Must deal with hot spots.

So much depends on how it's done - suggest a peer review system would work best - regulatory approach should be avoided to the maximum extent possible.

Agree in principle but unclear as to how such a program would be implemented. Who will enforce? How will it be enforced fairly?

If feasible significant expansion should be reviewed/evaluated to ensure that under the modified scenario the environmental impact is not significantly increased. Reasonable technology at reasonable costs should also be considered.

Economic pressures are to expand but environmental pressures are to remain same or reduce in size. Suggest BAWMPs be required for all new operations and eventually all done. Yes, we need a mechanism in place for existing operations, e.g. BAWMPs.

Show that a sufficient land base exists for waste management.

Maybe for today but rules change, new studies will change what is required. What does sustainable mean? Don't know what is going to happen i.e. with GATT (WTO), NAFTA. Cannot foresee what [the] future [is with] such uncertainty in markets for [the] food industry. Consumers [are] unaware of what it is to produce food. Needs a timeline. Have to have some legislation but must be tempered to the circumstances.

6) Local governments should be responsible for restricting land use changes which would limit agriculture.

This could be very dangerous because local governments do not have to be reasonable or have to look to the future and can be too complaint driven whether it is a problem or a nuisance.

Provincial control.

It should not be local governments who have this say. The ALR should stay as commercial farms.

Should be provincial.

Should be provincial.

Should be done at provincial level. Deter ALR land being used for non-agricultural purposes through taxation etc. Stabilize all land for agricultural use.

General uniformity of bylaws between municipalities would be important.

It is imperative that agriculture has similar guidelines and by-laws from one municipality to another. Local government does not have the resources to understand needs or problems of the industry. Local government must respect land use around and in the ALR.

Local government has no impetus to restrict land use.

Local government doesn't control what is in the ALR so it shouldn't control land use.

All agricultural land must be regulated, if you are not managing your land you don't get farm status. Local administration following regulations and principles set out by federal and provincial levels of government.

There would have to be guidelines because local governments usually don't care about agriculture.

Put all the pressure on government and off the farmer.

Must deal with local issues. Local government doesn't want to deal with regulation. Scary. Local government has to have an overall plan for agriculture.

Depending on the intent and whether it provides an overall holistic benefit to agriculture and the locality.

I don't know. It sounds like it will create more bureaucracy.

This should apply to all agriculture including hobby farms. Change focus of land taxes to eliminate farm tax rates for hobby farmers based on land use. Problem exists for under used land (latent hobby owners) vs. overused hobby farms i.e. horse farms. Need to have provincial government involved - not good use of municipal government. If local government restricts ag producers the producer must be allowed to sell land at fair price. Full use of ALR. Local government for administration but have provincial/regional gov't for regulation, but do not have local gov't setting regulations. Cannot have "across the board" regs because of LFV variability.

Restrict land use for development, not agriculture.

Problems with non-farming uses of ALR land and adjacent land to ALR being farmed. Competing pieces of legislation (contradictory). Technology to measure improvements. If can show that [a farm is] sustainable then [that farm] should be left [alone].

3.1.3 Section C - Reduction

7) To reduce problems all farms need to show they are sustainable by:

- **7a) developing Nutrient Management Plans**
- **7b) developing Best Agricultural Management Plan**
- **7c) modifying feed rations**
- **7d) demonstrating conservation farming practices**

Not for farms that don't need it.

I can see 7a, b being necessary if there is a problem in a specific area. But to ask for this for all farms is wrong and an unnecessary cost.

Only farms identified to have a surplus. Feed for dairy may be difficult to change without endangering cattle health and production, affecting viability.

No regulation; education.

7a,b when needed, but not by government regulation.

Where manure on a farm is not a problem leave alone. But where there is a problem all of the above apply.

Free soil test.

Modifying feed rations not economically feasible other than ammonia where it can be influenced simply by nutritionally formulating for dry litter. Gov't to pay cost of soil and manure testing.

Development of region by region conditions are essential. Areas of higher sensitivity should have parameters reflecting differences. Regulation is greatest fear and because areas are having difficulty all must comply with same regulation which becomes onerous on regulatory agencies and farmers.

These items are essential to providing the farmer with the ability to have minimal impact on the environment. The cost of these plans should be at least partially covered by a larger population than the individual farm family because of the benefits that accrue to the general population.

If all farms showed more interest in this there would be a lot less problems.

All farms, both [those] that produce manure and those that don't, for they are the end users and can absorb a great deal of ag waste.

These practices are being done in the feather industry and I agree with the process.

Under very broad guidelines.

At what cost.

Not compulsory but available. Work should be done to encourage use without regulations. In certain areas. Concerned about blanket regulations for feeds. Should know how food is grown elsewhere. Difficult to manage rations. Phosphorus in the feed should be emphasized. Buffer strips, catch crops; [there] needs to be a reasonable list to select from. Personal judgment [should be allowed], if it fails [the farmer] should be responsible.

If fertilization is ultimate goal (with manure) then reduction of phosphorus would be more important and probably overall more cost effective - N less important.

Should be prioritized by areas which are predetermined to be "hot spots".

It is my understanding that feed rations may need further study with respect to nitrogen reductions. If cost effective, feed rations is a good example of source reduction. A program is needed to evaluate effectiveness of above.

All would be best but are there resources to implement these. Barriers exist in terms of changing practices i.e. traditional practices.

All are needed.

Grandfather.

If they have the means to do it. A lot bigger than one producer. Need to develop alternatives and coordinate with other groups. Part of a chain. Limited by consumer perception. Must educate and convince feed cost. Feed ration changes will have large impacts on costs to both consumers.

8) Surplus manure (nutrients) should be:

8a) moved to deficit areas

8b) managed with on-farm treatment and moved to

- agricultural areas with deficit

- non-agricultural areas

8c) managed with central treatment and moved to:

- agricultural areas with deficit

- non-agricultural areas

May be cost prohibitive. Who will pay for treatment and hauling.

All good ideas but the economics are a problem.

Re non-ag areas - OK if mine reclamation sites. Central treatment causes double handling, not economically practical. The poultry industry may want to consider maintaining a central storage and loading facility to facilitate the quick turnaround of large quantity movement as back hauls to outer regions.

Any movement of manure, area to area, brings a whole new set of economics for any commodity. No commodity should include movement of manure as a cost of producing and should locate in a more environmentally sustainable area. Ministry of Agriculture should be involved by using municipal or Regions District building permits as an alarm to get MAFF involved. Marketing Boards could provide similar information. Land classification should reflect best uses for environmentally sensitive areas and ALR should be modified to allow best uses where agriculture is beyond sustainability.

Each and every option listed above may be the best in a given situation, but central treatment is not going to [be] economically viable in most situations.

No central storage, too much cost and a system can be set up on farm for removal.

Broiler manure is the only manure that can be moved [in a] cost effective [manner].

This would depend on how large the problem is i.e. central distribution with the large pool of surplus nutrients.

Disagree with spreading raw manure on non-ag areas. Agree with moving compost to non-ag areas. Central treatment; should go to end user not middlemen, agree if cost effective but hasn't proved to be effective, generally not economical.

Cheapest way is to move manure directly to market from farm. Some limited on-farm temporary storage may be necessary.

A combination of above, especially a and b. Agree with central treatment if viable facilities have succeeded elsewhere and follow similar model. Should be private facility with limited subsidization.

This is a site-specific question.

Dependent on type of manure. This is not practical for dairy manure to be moved. Layer/broiler manure is easier to move than dairy/hog. Each and every one of these are important options depending on the type of commodity. If it is economically feasible to compost and sell manure then great. Other experiences show that this option (central treatment) is not successful.

Centrally treated waste appears to be an uneconomic option.

Could be central distribution. Producers would probably use more if they knew the nutrient value and how to [use it]. People (urban) need to be more educated in what and how to use [manure] as well. Central area might be useful for coordinating. Would need long-term commitment for "treatment" to work.

9) Change existing environmental regulations to reduce likelihood of pollution.

If environmental regulations are reasonable, good regulations would help. But if regulations are unreasonable and made from poor information by someone not knowledgeable they can do damage. Regulations have to be based on sound scientific data, specific to areas, not blanket [for] all areas or [for the] province.

The environment people should not be the first people on a farm if there is a problem.

Code book should be sufficient.

Try to follow due process, there has been poor communication.

More producers help with environment.

First step, peer group inspectors to visit and make recommendations; second step, warning by MOE; final step, enforce existing regulations - levy penalties.

Regulations are now in place. No need for change in these. Waste management permits are not an answer.

More regulations simply breed more bureaucracy to monitor and enforce. Self-policing does more good as long as there is an over-riding law that can be invoked for the non-believers.

Let's just implement what regulations we have now.

We have numerous committees etc. to help police our regulations, AEPC is a positive step. Too bad we don't have the cooperation from the Ministry to help this process. Self-policing and education are the key to the betterment of farming.

Yes, but not an across the board regulation. It should allow the individual to develop a sustainable nutrient plan for his operation depending upon soil type, water table, rainfall, water courses etc.

Code gives environmental tool to deal with problems. Groundwater legislation is needed. More than enough regulation. Must make the AEPC peer advisors work.

Need groundwater legislation.

Not until existing regulations can be enforced adequately. Currently MELP is understaffed to adequately enforce current regs.

Consider start with a voluntary program and education. Evaluate results before considering mandatory regulations. Environmental regulations required for significant sources of pollution.

Improve regs to make [them] more straightforward to enforce Code. The use of peer inspections and self regulation is the desirable, therefore leave situation as status quo. If regs exist for pollution then leave them in place. Education is big part of regulations - rely on fieldmen and specialists therefore they need to be "educated" too.

This is difficult to regulate. Incentives would be more effective.

Individual situation - judged on own merit.

Cannot impose same on everybody as everyone is different. A lot of problems with existing farms [are] already there - cannot suddenly require huge changes.

10) Increase effort to educate, demonstrate and encourage sustainable farming.

Incentives for farmers to comply with sustainable farming, i.e. financial help in the form of grants etc.

Lack of education is the main problem. New information becomes available every day. We need to allow the farmer to adjust to new information. Time is the main problem.

Educate the consumer on farming practices and costs.

Government to help pay for Producers Groups for poultry, dairy, pigs.

Government funding that created and now partially funds [the] Sustainable Farming Groups has been an excellent use of tax dollars. Coordinators of these groups have done much to assist with the above #10 item. It is very critical to the continuing success of these Sustainable Groups that the level of government funding continue.

Sustainable farming needs economic viability to put wheels under the problem. Education and compliance to standards will be much easier to attain.

Much better use of money than increased regulation.

All land holders. Commercial farmers, hobby farmers and any land holder.

Education is key.

MAFF facilitate rewarding good farms; environmentally friendly sign. Environment should also reward and defend good farming practices. Should be a 1 cent per egg [charge] to go to [an] environmental fund. Educate consumer. Should be some form of grants for education, demonstration.

Use positive approach - develop "green" labels with consumers paying a slight premium for sustainably produced products.

[A] dedicated resource person [is] probably [better than] relying on volunteers. Funding either 100% with producer or cost share with government. Should not be 100% gov't funded.

Mechanisms for education, extension; farm groups, agencies as well as MAFF.

Yes, but educate the public about farm constraints and farm realities. BCMELP should invest heavily in public education about agricultural realities. The effort should be both for educating the farming community as well as consumers.

Acknowledge that each farm is individual. A lot more time, energy, resources are spent by commodities now on this, and capacity to do this is much more. The needs to be gov't support for this, however we have to tell government where to put support.

11) The economic responsibility for environmental compliance lies with

11a) individual
11b) industry / commodity
11c) government
11d) consumer
11e) combination of all of above

If agriculture is to survive then we need some support from government towards protecting the commodities. If we are to comply with all the rules and regulations imposed on us it costs money. To keep the farmers economically viable the cost of the product on the store shelf has to reflect the increased cost at the farm gate.

Taxes are high enough, government should be able to assist in these areas if they are so important.

We are all responsible. Government put green tax on agricultural commodities.

Government should act as facilitator re; low interest loans for capital costs of waste management improvements, partial payments to promote improvements. Government must protect Canadian farmers from imports from areas of much less environmental regulations, thus allowing imports to have a much lower COP.

Most countries which are serious about sustainability subsidize the industry and commodity to change or recover costs. Agriculture is competing in a global marketplace and costs should be in line with other countries. Low interest loans are best option with BAWMP used. BAWMPs should be borne by government. ALR taxation should reflect benefit that society receives for guaranteed green belt at little or no cost to society as a whole.

The economic responsibility lies essentially with the consumer, regardless of who pays for the facilities to achieve environmental compliance. It should be the individual or industry that spends the money to achieve compliance because that will generally give rise to the least expensive alternative, but some subsidy may be necessary.

Are all the same people. We are all consumers and tax payers and labourers and ...

New farms certainly know what is expected. Hard to disagree with the polluter pay principle. If the government wants the land freeze to stay the government must adjust. Incentive strategy is better than hard police type enforcement. Better to develop a partnership, must work harder.

I think the producer should pay the vast majority of costs. Government subsidy should continue as is or [be] moderately increased.

Reality is [that we] may need subsidization.

The consumer ultimately, but producers cannot raise prices accordingly. But improvements have been funded by industry/commodity groups depending upon the commodity, so realistically combination of above (can put environmental tax on food).

Local producers are competing against an unequal playing field market environment in the world economy.

All should be responsible and the Ministry of Environment should be the catalyst and should also play a better leadership role.

Every problem is site specific and should be evaluated accordingly.

3.1.4 Section D - Sustainability

12) The evaluation of whether agriculture is approaching sustainability is the responsibility of

- **12a) industry / commodity**
- **12b) government**
- **12c) university / third party**
- **12d) combination of all of above**

All sections should have input into all decisions. Government leading.

It is important for major stakeholders to be involved in process.

Set standard first. It should no be on each commodity. Also responsibility of Stewardship of Land.

All should have input. Must have indicators, data, interpretation to develop policy. Truthing of information with stakeholders. Should be a combination of the above. Don't have a problem with where manure is going. Design of questionnaire for Stats Canada to make it better.

Combination of above but must have standards set before you evaluate - same standards for all commodities; "thou shall not pollute". Sustainability is different for different commodities but environmental standards should be the same for all commodities. Sustainability will change over time.

All should be concerned but the university should be given a more active role. Governments should administrate.

3.1.5 Section E - Timeframes

Stabilization

Hot spots should [be eliminated] in 1-3 yrs, or longer depending on the problems being solved.

[With] unlimited money (grants), 12 months. [With] loans at 1/2 prime, 5 years.

Site specific.

Reduction

Through education and maybe tax incentives promote replacing inorganic fertilizers with manure. Through land based taxes cause increased taxes if land inactive and decreased if crops grown using manures as fertilizers.

Site specific.

Sustainability

10 years or more according to economics.

Sustainability should be looked at commodity by commodity which will close time frame.

Agriculture must be economically viable to the future.

A moving, dynamic thing.

Site specific.

3.2 FACILITATOR SUMMARY COMMENTS

3.2.1 Group A Facilitator Comments

We have hot spots but generally agriculture is OK.

Don't need blanket solutions.

Local government involvement is not popular; they place too much emphasis on urban issues.

Best Agricultural Waste Management Plans, Nutrient Management Plans; there is concern that these might become compulsory, if so they should be provided for the producer.

Do not need more regulations, everyone should comply with the Code of Agricultural Practice.

Need more education and demonstration.

Financial incentives are a worthwhile tool.

Need awards, recognition for good environmental practice, endorsed by BCMELP.

The government should ultimately be responsible for determining if sustainability is being achieved, but everyone should be involved

3.2.2 Group B Facilitator Comments

Problem Stabilization - Options and comments:

Dollars will be needed - who will pay?

Could redistribute manure - again, economic considerations.

Ensure that we make full use of the Agricultural Land Reserve - need to re-evaluate policies (and economics) on a periodic basis as circumstances change. Use tax structure to encourage commercial agricultural use. Producers identified a problem with "hobby farms" which are effectively taking land out of production, and reducing land available for manure application. This was contentious as a minority of producers were reluctant to potentially lose the opportunity to sub-divide their land when they retire from farming (i.e. no hobby farming until I am finished farming).

Use inorganic fertilizers as a last resort. Educate fertilizer advisors. The need for unbiased advise and accurate information on nutrient requirements was identified.

Land use should be managed at a provincial level to ensure some stability and large-scale uniformity in management on land use. It was believed that putting local governments in charge would result in wide discrepancies between areas, and would result in instability as the rules would change too often.

Problem Reduction - Options and comments:

Target the problem cases and bring them into compliance with the Agricultural Waste Control Regulation.

Avoid excess regulations. Make use of education (i.e. the carrot approach is preferred to the stick).

Economics:

- consider financial incentives
- must develop solutions to a wide range of problems
- protection of riparian zones is not economical under current circumstances
- consumer should pay portion of costs, but how can this be done with our current system? The easiest way would be to establish taxes which cover costs of changing practices.

Movement of manure to other areas; a good idea, but economics?

Need more research to identify workable solutions.

Need to address areas where there are conflicting requirements, such as drainage ditches - how can they be managed to reduce impacts on fish?

Need increased awareness of the value of manure (beyond the farm community and region). Could work on developing compost products for off-farm use.

Problems which need to be addressed include competing against areas outside the lower Fraser, including the US, which have lower environmental requirements.

Need uniform regulations and enforcement within the agricultural community and relative to other land uses, including urban. Want to have peer response as first action to result from complaint (AEPC inspectors). Inspectors must be trained and more inspectors are needed.

Concerns were identified with regard to media issues - i.e. portraying farmers as the "bad guys".

Sustainability - Options

Everybody's responsibility. There is a need for clearly identified common goals and improved awareness of conditions. There is a need for everybody to work together. Need to have a balanced perspective i.e. look at the whole picture.

Land for agriculture must be left for real farmers.

Maximum utilization of manure nutrients.

Local government involvement is not popular.

Best Agricultural Waste Management Plans (BAWMPs), Nutrient Management Plans (NMPs); should not be mandated, should be encouraged through commodity groups.

Changing feed rations; an economic and education component.

Demonstrate conservation farming techniques.

Economics is a key issue.

Application of regulations to provide a level playing field.

If regulations are to be changed producers need adequate lead time.

Everyone should pay, everyone has a role.

In evaluating sustainability there is a role for everyone to work together.

3.2.3 Group C Facilitator Comments

Need more monitoring to evaluate situations. If all poultry manure was removed from the Abbotsford Aquifer recharge area would we be OK?

Should have free, confidential soil and manure analysis.

Buy out farms which are troublesome.

Revisit ALR with respect to high density farms.

A central organization for movement of manure.

Different areas have different needs

Time frame a function of economics. With enough money could solve the problems quite quickly.

3.2.4 Group D Facilitator Comments

New farms should require a BAWMP. Eventually all farms should have one.

Local governments should not be involved in setting the rules, they could be involved in the administration of the rules.

Better utilization of the ALR.

Surplus manure situation is different for different commodities. Composting and selling of surplus manure would be great.

Peer inspections should continue, but inspectors need better education. Industry fieldmen need better education.

Economic responsibility lies with the consumer.

Standards are required to evaluate sustainability.

3.2.5 Group E Facilitator Comments

Need to consider the next generation of farmers.

Both the generator and the receiver of wastes must achieve sustainability.

What are the environmental costs incurred by the competition?

Different commodities require different solutions and different zones (areas) have different needs. These differences will influence the time frame.

Need a better understanding of where we are.

3.3 OTHER COMMENTS NOTED DURING WORKSHOP

Public needs to educated, they have to accept some additional costs.

Agriculture should not be accused of causing a problem, rather objectives are rising and we want to avoid reaching an irreversible or worse situation.

Fieldmen are important in disseminating information.

Regarding buffer strips, there is the cost of land, weed problems, shading of crops, conflicts with municipal drainage (want to keep the ditches clean).

When the ALR was introduced farmers were promised a reasonable return. Society must pay something to maintain the ALR.

Financial incentives are cheaper solution than regulation and enforcement. Want behaviour to change.

If individuals or industry groups look after doing the work it will be done more efficiently than if done by government, but perhaps there should be some reimbursement.

What should be done when an investment is required for a farm which is too small and which should be incorporated with the neighbouring property?

Paying a fine may be an affordable cost of doing business.

Financial institutions lend on market value, and the appraised value after improvements may not (usually does not) reflect 100% of the cost of the improvement.

4.0 INTERPRETATION OF QUESTIONNAIRE ANSWERS AND COMMENTS

The following sections contain graphical summaries of producers' answers to questions from the questionnaire and interpretations of comments made by producers.

4.1 SECTION A - GENERAL

1) The following type of pollution is occurring in agricultural areas: (Figure 1)

- **1a) AIR**
- **1b) WATER**
- **1c) SOIL**

2) Agriculture is an important contributor to pollution: (Figure 1)

- **2a) in all areas of the Lower Fraser Valley**
- **2b) certain areas of the Fraser Valley**

3) Agriculture will need to do more than it is currently doing if environmental problems are to be resolved. (Figure 2)

4) Sustainable agri-food systems are "those that are economically viable, and meet society's need for safe and nutritious food, while conserving or enhancing natural resources and the quality of the environment for future generations". (Figure 2)

There appears to be strong agreement from the producers who attended the workshop that agricultural activities are contributing to water pollution but only moderate agreement that there are soil or air pollution problems associated with agriculture.

Answers to question 2 and comments indicate that there is a strong feeling that pollution from agriculture is localized and not a widespread problem over the entire Fraser Valley.

There was a moderately strong agreement that agriculture will have to do more if environmental problems are to be resolved, and a feeling that agricultural producers are prepared to do their part if the economic issues are properly addressed.

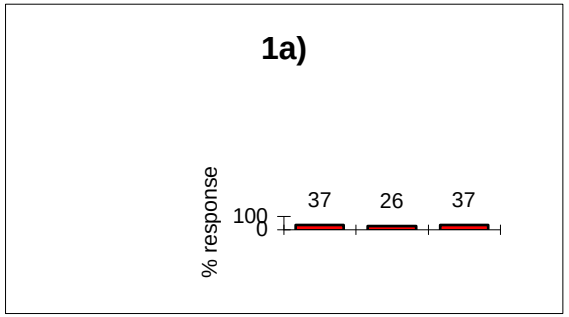
Responsibility for the costs of improved environmental performance was a recurring theme throughout the workshop. Producers appear very concerned that environmental regulations will impose extra costs on them which their competitors do not, or will not, have to contend with.

There was agreement with the definition of sustainable agriculture, "sustainable agri-food systems are economically viable, and meet society's need for safe and nutritious food, while conserving or enhancing natural resources and the quality of the environment for future generations".

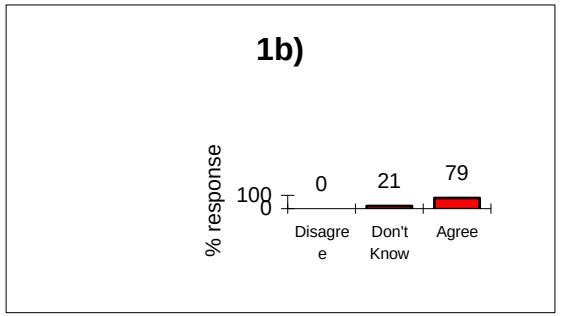
Figure 1 **Producer Answers to Questions 1 and 2**

1. The following type of pollution is occurring in agricultural areas

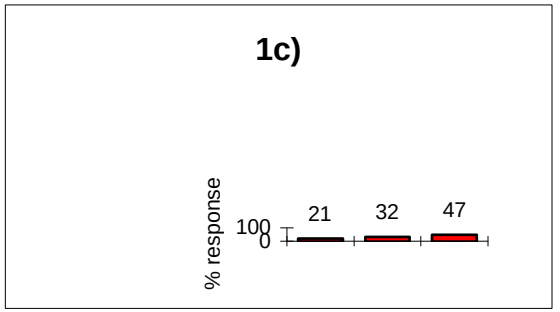
AIR



WATER

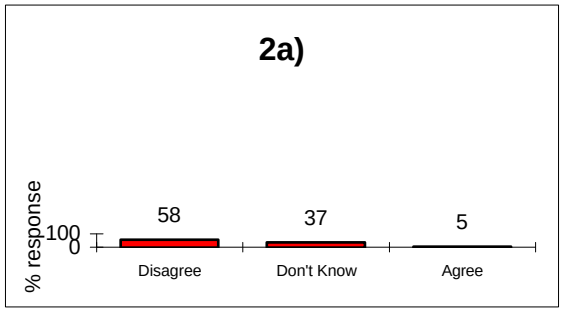


SOIL



2. Agriculture is an important contributor to pollution

a) in all areas of the Fraser Valley



b) in certain areas of the Fraser Valley

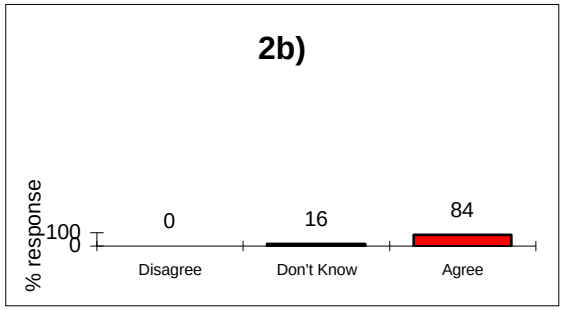
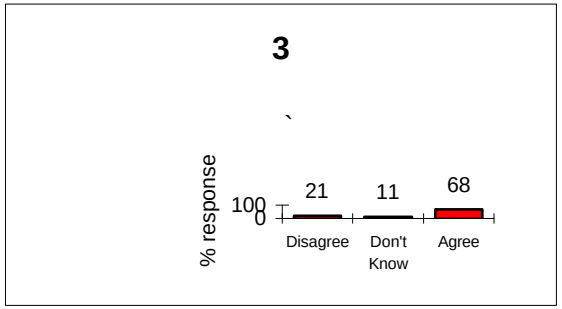
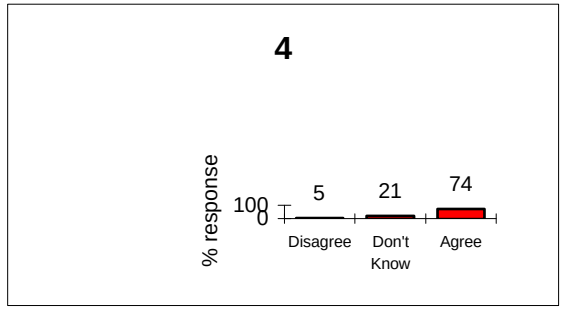


Figure 2 **Producer Answers to Questions 3 to 6**

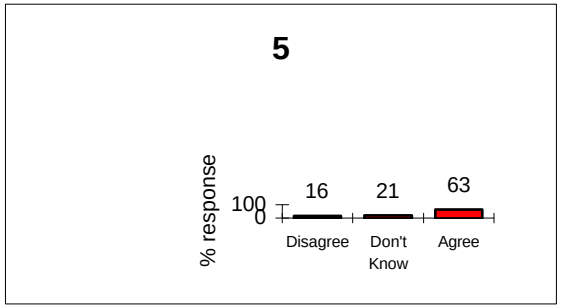
3. Agriculture will need to do more than it is currently doing if environmental problems are to be resolved



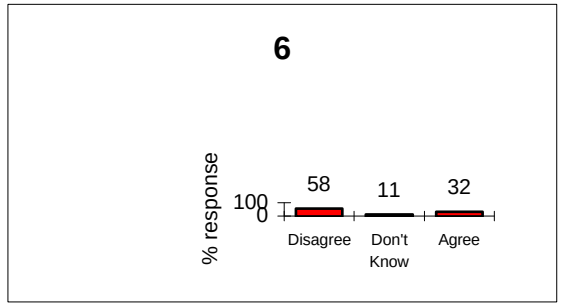
4. Sustainable agri-food systems are economically viable, and meet society's need for safe and nutritious food, while conserving or enhancing natural resources and the quality of the environment for future generations



5. To keep problems from getting worse, all new or expanding farms first need to demonstrate they are sustainable



6. Local governments should be responsible for restricting land use changes which would limit agriculture



4.2 SECTION B - STABILIZATION

5) To keep problems from getting worse, all new or expanding farms first need to demonstrate they are sustainable. (Figure 2)

There was agreement for new or expanding farms to demonstrate sustainability, but the comments made to this question indicate that some of the attending producers feel that this should be required in some locations only and should not be a requirement for all farms in the Lower Fraser Valley.

Concern was also expressed about how the definition of sustainability would be applied and who would make the decisions as to whether or not sustainability would be achieved.

Again, the issue of economics (who pays the costs) was raised several times.

6) Local governments should be responsible for restricting land use changes which would limit agriculture. (Figure 2)

There appears to be good agreement with the principle of restricting land use changes which would have negative impacts on agriculture, however attending producers disagreed with the concept of local governments having authority. The consensus appears to be that such land use policy should be set by the provincial government with local governments possibly having a role in implementation of the policy.

4.3 SECTION C - REDUCTION

7) To reduce problems all farms need to show they are sustainable by: (Figure 3)

7a) developing Nutrient Management Plans
7b) developing Best Agricultural Management Plan
7c) modifying feed rations
7d) demonstrating conservation farming practices

There was generally strong agreement with having producers demonstrate sustainability by developing Best Agricultural Waste Management Plans and using conservation farming techniques.

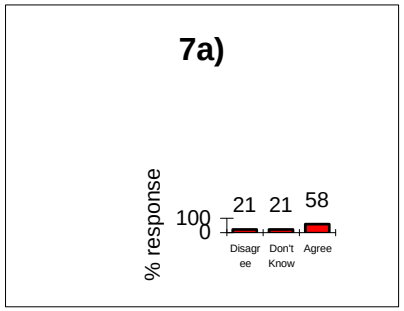
Several producers believed that such demonstration should only be required in certain areas.

There were mixed reactions to the concept of reducing nutrient production by modifying feed rations; this may indicate a lack of understanding as this is an area which requires further research and has not been strongly promoted.

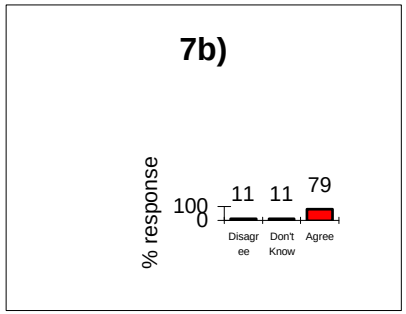
Figure 3 **Producer Answers to Questions 7 and 8**

7. To reduce problems all farms need to show they are sustainable by:

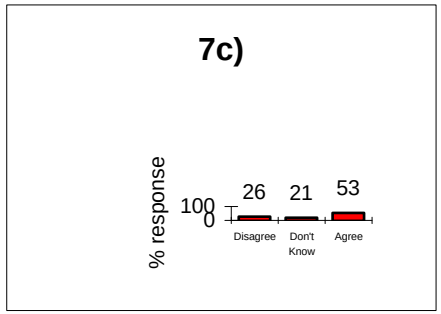
a) developing Nutrient Management Plans



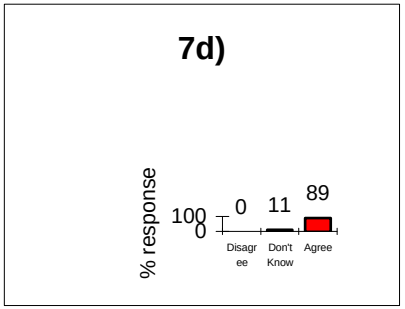
b) developing Best Agricultural Waste Management Plans



c) modifying feed rations



d) demonstrating conservation farming practices



Surplus manure (nutrients) should be:

8a) moved to deficit areas

b) managed with on-farm treatment and moved to

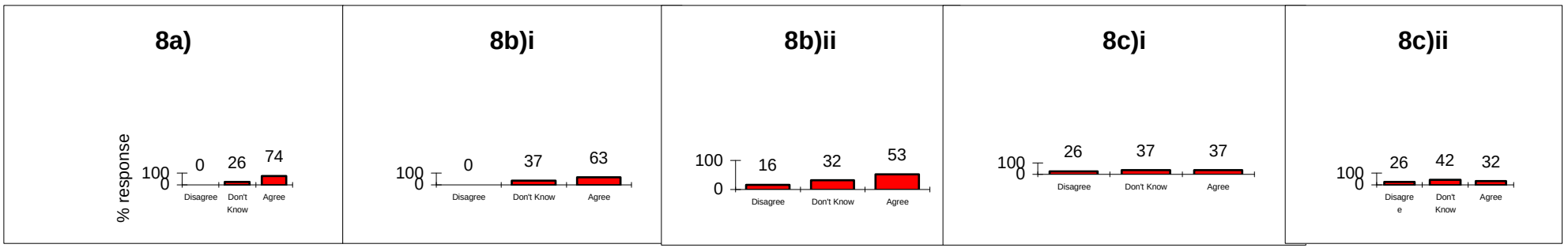
i) agricultural areas

ii) non-agricultural areas

c) managed with central treatment and moved to

i) agricultural areas

ii) non-agricultural areas



8) Surplus manure (nutrients) should be: (Figure 3)

8a) moved to deficit areas

8b) managed with on-farm treatment and moved to

- agricultural areas with deficit

- non-agricultural areas

8c) managed with central treatment and moved to:

- agricultural areas with deficit

- non-agricultural areas

There was agreement with the concept of moving manure nutrients from areas of surplus to areas of deficit, particularly to other agricultural areas where crop nutrient removal exceeds manure nutrient production.

Several producers indicated that some level of treatment, such as composting, would be needed before surplus manure could be moved to non-agricultural lands.

The concept of central treatment was generally not accepted.

9) Change existing environmental regulations to reduce likelihood of pollution. (Figure 4)

There was strong disagreement with changing environmental regulations. There appeared to be a consensus that the Code of Agricultural Practice provided the necessary regulation and if the Code were enforced there would be no need for further regulation.

Several comments indicated that improved education and self-policing would be a better alternative than adding more regulation. There appears to be general support for self-policing, several comments indicate that peer advisors should be the first to discuss problems with individual producers.

Several comments indicated a need to better define certain principles outlined in the Code and do a better job of enforcing the Code.

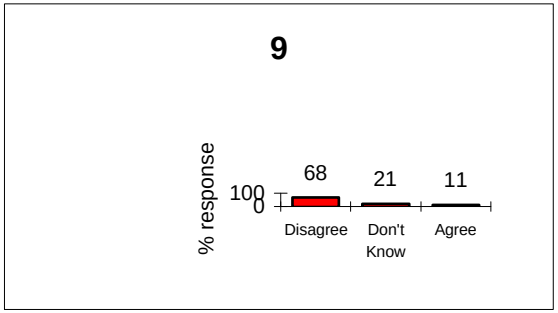
10) Increase effort to educate, demonstrate and encourage sustainable farming. (Figure 4)

There was very strong agreement with increasing efforts in the areas of education and demonstration.

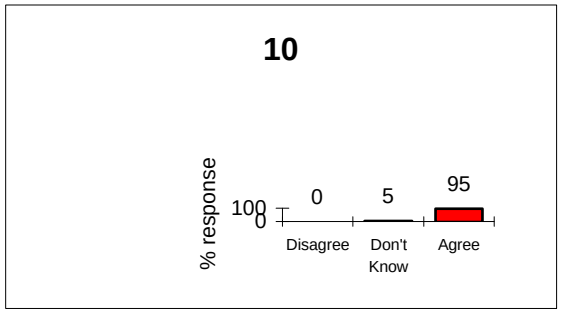
Several comments indicated a need for increasing the awareness of the non-farming public to agricultural issues.

Figure 4 **Producer Answers to Questions 9 to 11**

9. Change existing environmental regulations to reduce likelihood of pollution

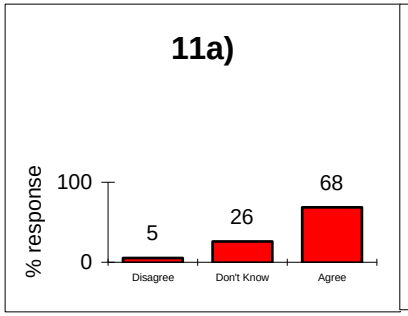


10. Increase effort to educate demonstrate and encourage sustainable farming

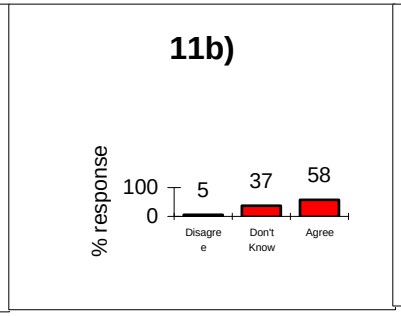


11. The economic responsibility for environmental compliance lies with

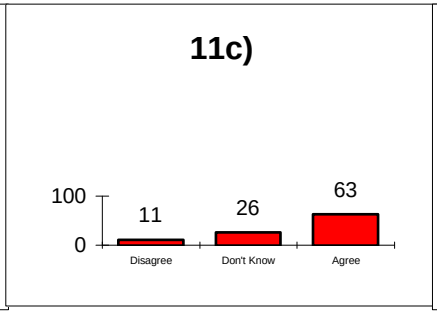
a) individual



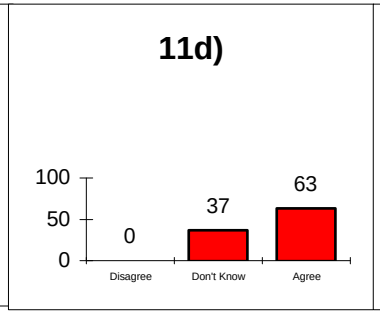
b) industry / commodity



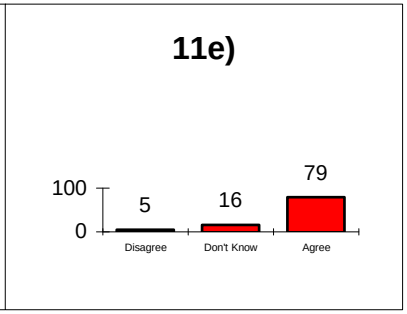
c) government



d) consumer



e) combination



11) The economic responsibility for environmental compliance lies with (Figure 4)

- **11a) individual**
- **11b) industry / commodity**
- **11c) government**
- **11d) consumer**
- **11e) combination of all of above**

Answers provided on the questionnaire indicated a strong agreement with having the economic responsibility of environmental compliance shared by all members of society, however the comments indicated that most believe that the costs should ultimately be borne by the consumer.

On-farm economics is the major concern of the producers. They feel that they cannot afford the improvements required or desired for environmental compliance because they must compete with other producers who face a lesser amount of regulation.

4.4 SECTION D - SUSTAINABILITY

12) The evaluation of whether agriculture is approaching sustainability is the responsibility of (Figure 5)

- **12a) industry / commodity**
- **12b) government**
- **12c) university / third party**
- **12d) combination of all of above**

There were several "don't know" responses to the questions on responsibility for evaluating agriculture's success in achieving environmental sustainability, although it appears that there is some agreement that all stakeholders should be involved.

Comments indicated that, even though all stakeholders should be involved, government should take a lead role.

4.5 SECTION E - TIMEFRAMES (Figure 5)

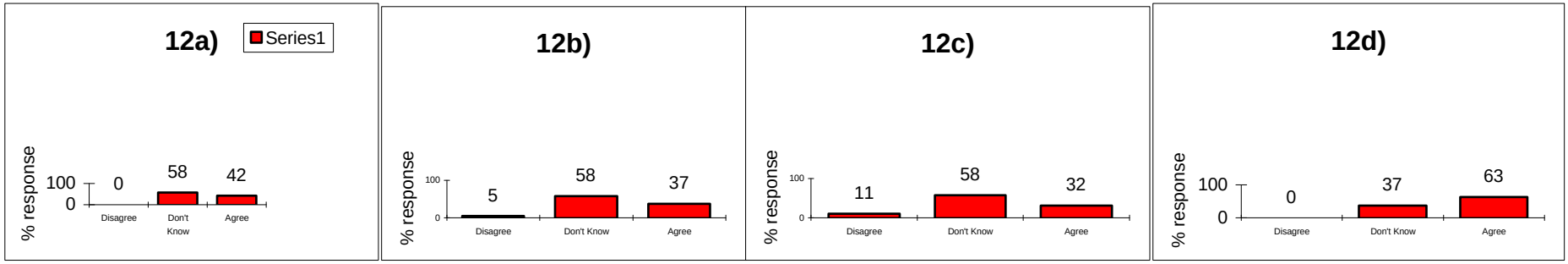
The majority of the producers responding to the question on appropriate timeframes indicated that 1 to 5 years would be required for stabilization, 1 to 10 years for reduction and 10 years to achieve sustainability.

Comments to this question indicated that economic factors would influence required timeframes.

Figure 5 **Producer Answers to Question 12 and Timeframe Response**

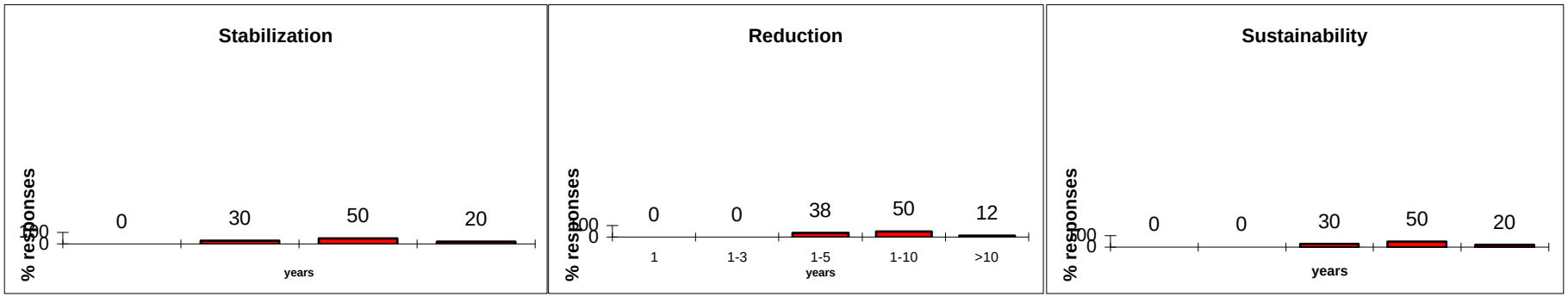
12. The evaluation of whether agriculture is approaching sustainability is the responsibility of

a) industry / commodity **b) government** **c) university / third party** **d) comination of all**



Most Appropriate Timeframe for achieving:

Stabilization **Reduction** **Sustainability**



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Orlando Schmidt. Professional Advisor. Dairy Producers' Conservation Group. Abbotsford, B.C.

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J.C. Yu. Professional Advisor. Hog Producers' Sustainable Farming Group. Abbotsford, B.C.

Bernie Zebarth. Research Scientist. Pacific Agriculture Research Centre. Agriculture and Agri-Food Canada. Agassiz, B.C.

APPENDIX A

ORGANIZATIONS AND GROUPS INVITED TO ATTEND WORKSHOP

INFORMATION INCLUDED WITH INVITATIONS

Organizations and groups invited to attend the workshop:

BC Federation of Agriculture

BC Broiler Hatching Egg Producers' Association

BC Chicken Growers' Association

BC Turkey Association

Fraser Valley Egg Producers' Association

Sustainable Poultry Farming Group

BC Hog Marketing Commission

Hog Producers' Sustainable Farming Group

Independent Dairymen's Association of BC

BC Milk Producers' Association

Agri Food International Co-op (Fraser Valley Milk Producers' Association)

Dairy Producers' Conservation Group

Sumas Conservation Group

Langley-Matsqui Uplands Conservation Group

BC Nursery Trades Association

BC Raspberry Growers' Association

BC Vegetable Marketing Commission

Delta Farmers' Institute

Horse Council of BC

BC Association of Cattle Feeders

APPENDIX B

DRAFT INTERIM SUMMARY REPORT

Management of Agricultural Wastes in the Lower Fraser Valley
INTERIM SUMMARY REPORT

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1.0 INTRODUCTION

The "Management of Agricultural Wastes in the Lower Fraser Valley" program consists of a series of projects designed to evaluate the production, treatment and disposal of agricultural wastes, primarily manure. The goal of this program is to present a balanced, objective summary of data and ideas to serve as a solid background against which policies and strategies for improving nutrient (manure and inorganic fertilizers) management can be developed.

The program is being conducted under the guidance of an interagency, intergovernmental Steering Committee with representatives from:

- BC Environment
- BC Federation of Agriculture
- BC Ministry of Agriculture, Fisheries and Food
- Environment Canada
- Agriculture and Agri-Food Canada
- Fisheries and Oceans Canada
- Westwater Research Centre (UBC)

The Lower Fraser Valley (LFV) has been divided into twenty Agricultural Waste Management Zones (AWMZs) based on municipal boundaries, and in some cases further subdivisions based on watershed or predominant agricultural land use considerations. AWMZ boundaries are shown in Figure 1.

The studies have relied heavily on work by others, particularly that of the various sustainable farming groups, and on consultation workshops with several technical specialists.

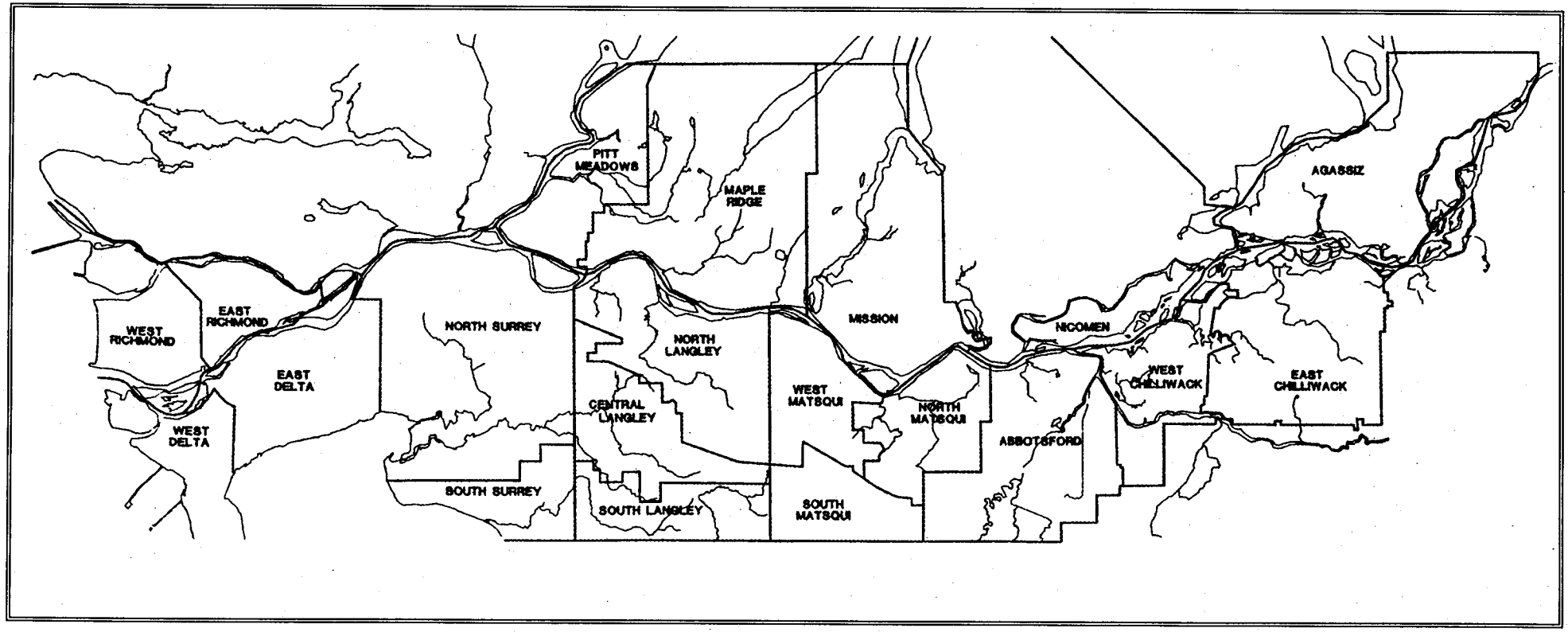
Livestock and poultry, land use and inorganic fertilizer use inventories have been used in a nutrient management model to estimate the amount of nutrients going to water, soil and air. The term nutrients refers to the plant nutrients in manure and inorganic fertilizers. The model was also used to estimate the impacts of various improved management scenarios.

The objectives of the program can be stated as three questions;

- what is the current state of agricultural nutrient management
- what are practical options for improvements, and
- how might these options be implemented.

Incorporating inventory data into the model has provided us with an understanding of the current nutrient balance situation in the Lower Fraser Valley. Clearly, in many areas there is a significant excess of nutrients being applied to the land, which is resulting in contamination of surface and ground water supplies. Use of the model has also allowed us to estimate the effectiveness of several approaches to addressing nutrient management issues. We must now identify the practical options and decide how to implement the necessary changes.

Figure 1 : Twenty Agricultural Waste Management Zones Used in the Management of Agricultrural Wastes in the Lower Fraser Valley Program



2.0 AGRICULTURAL INVENTORY

Information from the 1991 Census of Agriculture was used to produce an inventory of the number and type of livestock and poultry, the area farmed by crop and the application of manure and inorganic fertilizers for each of the AWMZs.

Data were collected for two farm categories; large farms and small farms. For this study large farms are defined as those with gross annual farm receipts of $40,000 or above, small farms have gross farm receipts below $40,000 per year.

Subsequent work has concentrated on the large farm category. This focus on large farms does not indicate that small farms are considered to be problem free, in fact it is anticipated that non-point source nutrient loadings from the hobby farm sector may be significant in some areas (other studies in the LFV have indicated that there are significant waste management concerns with small farms) and it is anticipated that this can be looked at in more detail in the near future.

Census of Agriculture data is often criticized for being limited and incomplete, however it is the most comprehensive data base on livestock and poultry numbers and current land use which is readily available and which includes all of the Lower Fraser Valley.

Comparisons with other livestock inventory information indicate that the Census data generally underestimates the actual livestock and poultry numbers. The degree of under reporting of livestock and poultry varies from perhaps 5% to 15% for dairy cattle, poultry and swine, to 50% to 60% for horses. Other agricultural land base data suggests that the Census also underestimates the actual land base. However it was concluded that the Census data was the best set of inventory data available and this data was used in subsequent work.

The inventory data reflects the diverse nature of agricultural activity in the LFV; there is a wide variation in livestock densities, which in some areas is very high, and cropping patterns between zones.

3.0 AGRICULTURAL NUTRIENTS

To generate estimates of nutrient flows and to estimate the impacts which improved nutrient management might have a mass balance model was developed. The model attempts to track the flow of the major nutrients through agricultural systems in the Lower Fraser Valley.

Nutrients contained in manure (primarily nitrogen, phosphorus and potassium) are estimated using animal numbers and typical manure nutrient content for various animal types. The different manure management systems used in Fraser Valley agriculture are considered and the losses are estimated for each step in the manure management process. The nutrients removed from an area are estimated using cropping inventories and typical potential crop nutrient removal rates (the amount of nutrients which are removed in the harvested portion of the crop).

Estimates of net manure nutrient applications, inorganic fertilizer applications, atmospheric deposition and potential crop removal are then used to estimate a balance. Balances are the net nutrient applications less potential crop removal.

Balances are combined with nutrient losses during manure management to estimate the nutrient loading to groundwater, surface water, soil and the air.

The model uses a number of assumptions which were based on the experience and research of technical experts. The numbers generated by the model should be viewed as estimates only and considered as nutrient loading indices.

4.0 THE SITUATION IN 1991

In assessing the significance of the estimated balances it is important to understand that losses of nutrients from soils is natural and cannot be eliminated from agricultural systems and that some application of nutrients in excess of crop removal is needed to maintain soil productivity. Therefore a "zero balance" cannot be an attainable objective of responsible nutrient management. To determine if a particular balance is excessive or not the ultimate destination (surface water, groundwater, soil or air) and the sensitivity of that destination to nutrient loading must be considered.

For the purposes of this study it was estimated that a practical target for target for nitrogen balances might fall in the 50 to 100 kg N/ha range. Further research is needed to determine if these targets are adequate to provide protection to the environment.

Figure 2 shows the zonal nitrogen balances which were estimated for each of the 20 AWMZs as of 1991 and Figure 3 is a graphical presentation of the percentage of the total cropped area for which average balances within an AWMZ exceed the balance value.

The estimated nitrogen balance in 3 of the twenty AWMZs, representing 10% of the total cropped area, exceeded 200 kg N/ha. The estimated balances exceed 100 kg N/ha in another 7 AWMZs (representing a further 47% of the total cropped area). A further 6 AWMZs (21% of the cropped area) have estimated balances between 50 and 100 kg N/ha.

Figures 4 and 5 show the estimated balances for phosphorus and potassium.

These results suggest that a large percentage of the Lower Fraser Valley agricultural land base is receiving excessive applications of nutrients.

Figure 2

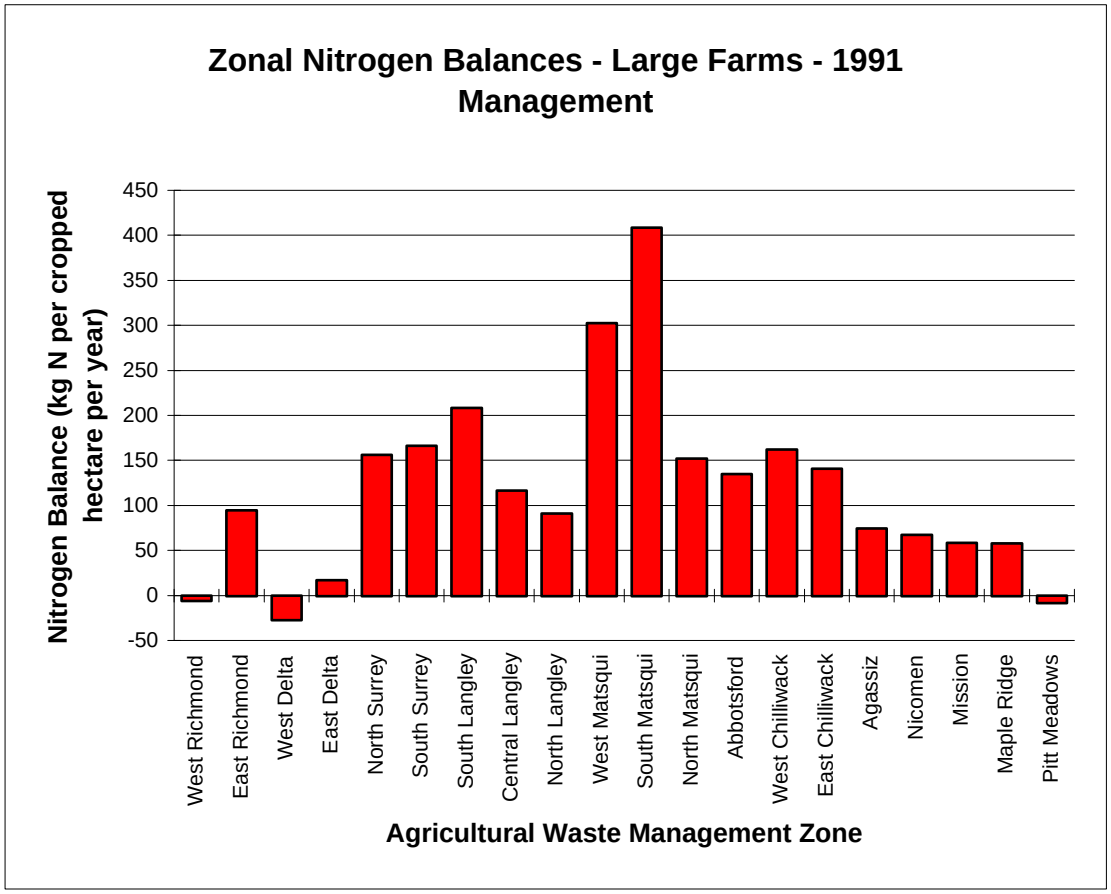


Figure 3

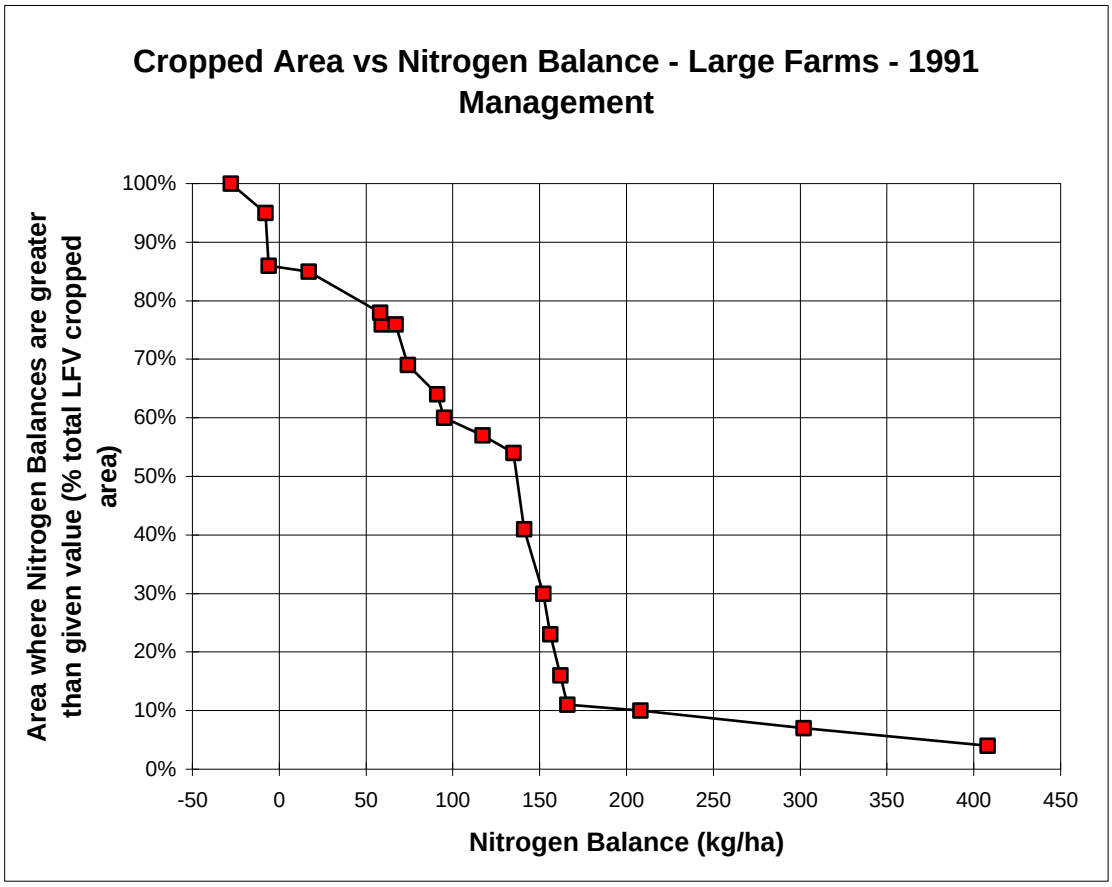


Figure 4

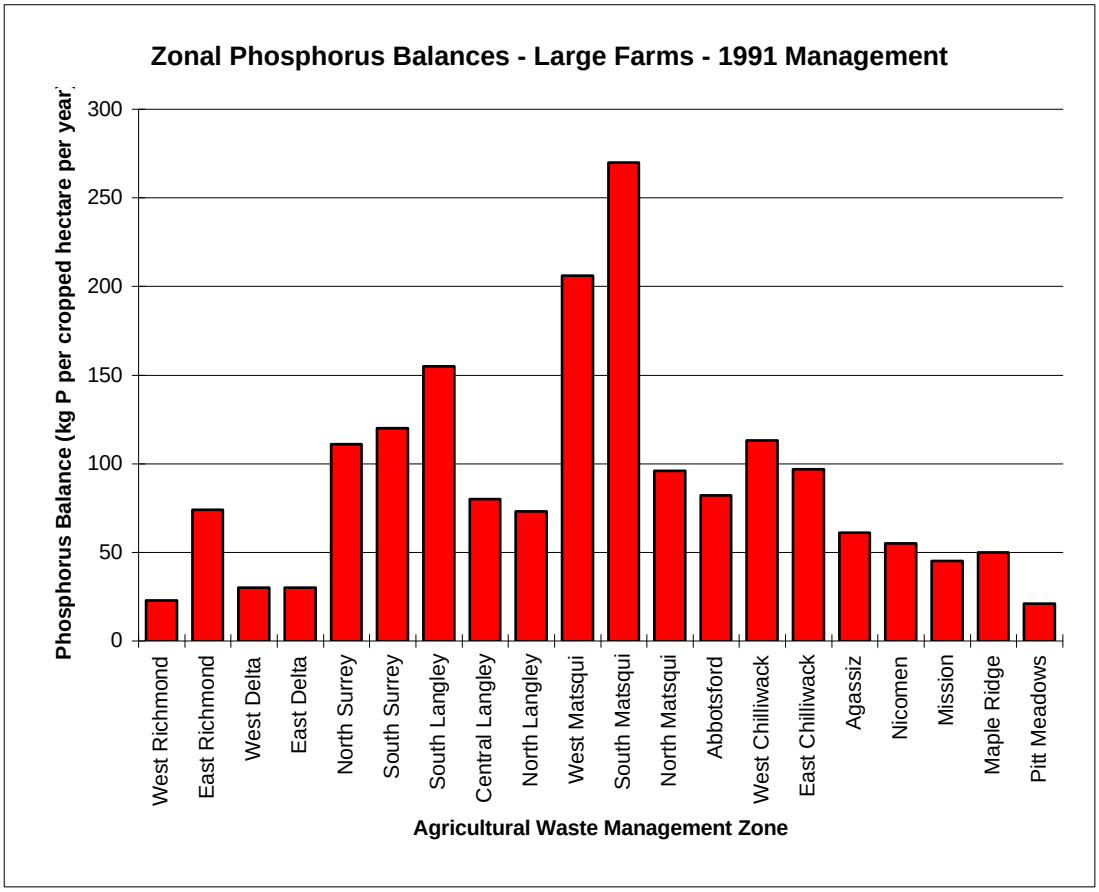
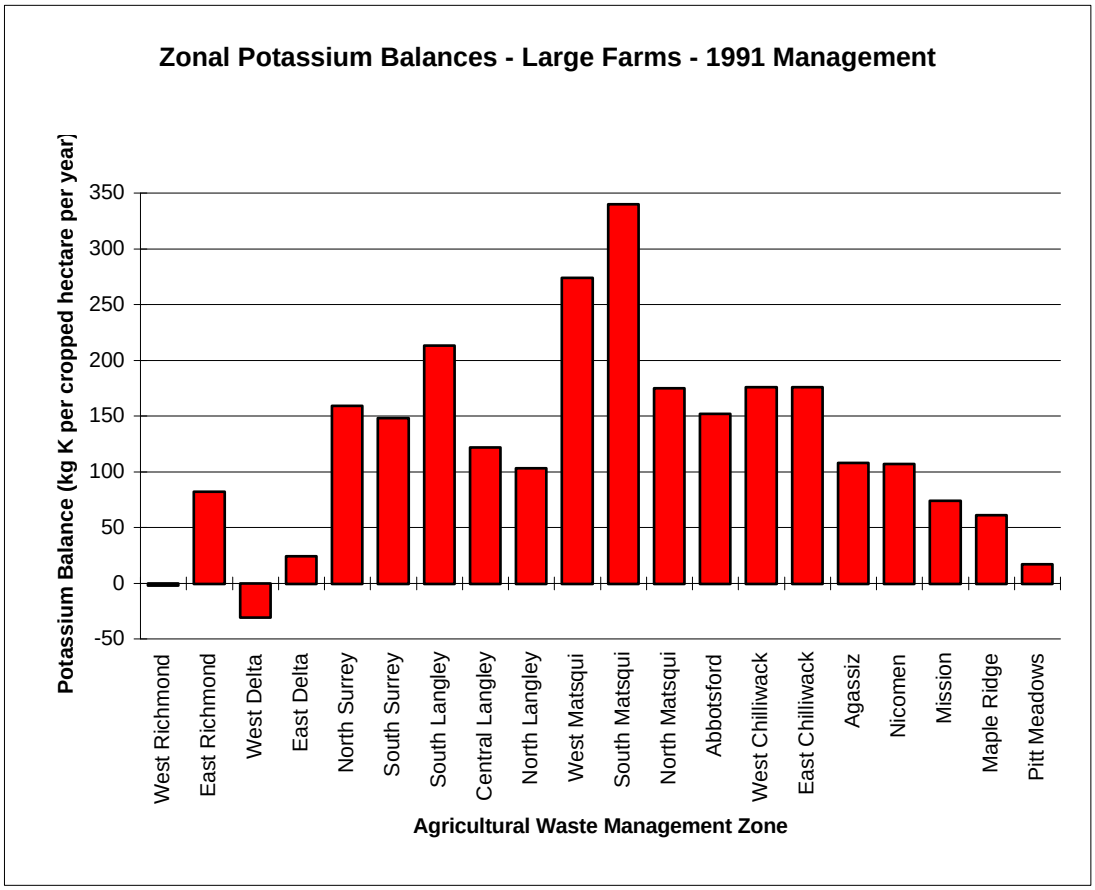


Figure 5



5.0 THE ISSUES

Nitrogen and Phosphorus

Agricultural activities have been implicated as the primary cause of high nitrate concentrations in several Lower Fraser Valley groundwater sources, most notably the Abbotsford aquifer where nitrate concentrations well in excess of drinking water standards are common. Other studies have indicated that agriculture has been significant in degrading surface water.

The South Matsqui AWMZ includes the majority of the Canadian portion of the Abbotsford aquifer recharge area. Agriculture, and in particular manure management, has been implicated as the most significant contributor to the unacceptably high level of nitrates. A nitrogen balance of 408 kg-N/cropped ha/yr) was estimated for this AWMZ.

Studies of the Matsqui Slough and Sumas River Watersheds have suggested that agriculture is a significant contributor to degraded surface water quality in both watersheds and degraded groundwater quality in the Matsqui Slough watershed. The boundaries of the Matsqui Slough watershed area are similar to those of the North Matsqui AWMZ (where the nitrogen balance was estimated to be 152 kg-N/cropped ha/yr) and those of the Sumas River watershed similar to those of the Abbotsford AWMZ (where the nitrogen balance was estimated to be 135 kg-N/cropped ha/yr).

Impacts to water fall into three general categories; introduction of toxic substances, eutrophication and oxygen depletion. Within the Lower Fraser Valley the major concern with the aquatic environment is often the oxygen content of the water.

The ammonia, nitrite and nitrate forms of nitrogen can all be toxic to both humans and aquatic life.

Inorganic nutrients, primarily nitrogen and phosphorus, can promote the growth of algae in the receiving waters. During daylight hours and while the algae is growing the amount of oxygen released through photosynthesis tends to be greater than that consumed through respiration, increasing the oxygen content of the water. However, at night algae becomes a net consumer of oxygen and may deplete oxygen from the surface waters where algal growth is excessive. In addition the growth of the algae creates organic matter which, when it dies and decomposes, generates an oxygen demand. Excessive algal growth can also physically damage habitat by covering the substrate and be responsible for the aesthetically poor conditions observed in some watercourses.

Potassium

Excessive applications of potassium may lead to a magnesium imbalance in crops and in the animals which feed on the crops; forage crops will consume more potassium than is required for their growth. This problem is evident in several areas within the Fraser Valley with magnesium being added to both dairy rations and fertilizer mixes in an effort to correct the imbalance.

This can be a costly problem for dairy operations and there are estimates that up to 75% of Lower Fraser Valley dairy operations suffer from problems associated with excess potassium. Potassium related problems include increased energy consumption, kidney stress and magnesium deficiency.

Air Quality

The most significant air quality issue related to agriculture is fine particulate matter. These small particles are small enough to penetrate deep within the lungs and lead to serious respiratory problems. They are also very efficient in scattering light thereby producing significant visibility concerns. Current levels of fine particulates may constitute a greater danger to health than other air quality concerns such as ground level ozone, sulphur dioxide and carbon monoxide.

Recent research on air quality suggests that ammonia may play a key role in the formation of fine particulates through the formation of ammonium nitrate and ammonium sulphate, and agriculture is thought to be the major source of atmospheric ammonia. An emphasis on this process has occurred only recently (within the past year) after it was found that the air above the Lower Fraser Valley has surprisingly high levels of ammonia.

6.0 IMPROVEMENTS ARE POSSIBLE

Model inputs were changed to look at two improved management scenarios. The first assumed a reasonable reduced rate of inorganic fertilizer use (inorganic fertilizer use was set at 30% of crop removal rates) and improved manure management (no losses during the manure handling process and sufficient storage capacity so there was no winter spreading of manure). The second scenario added feeding strategies which would, by improving nutrient utilization efficiency, reduce the amount of nutrients excreted by livestock.

The nutrient loading estimates with these improvements in place are summarized in Figures 6 to 9.

Figure 6 shows nitrogen balances for each of the AWMZs and Figure 7 shows the percentage of the total cropped area for which balances exceed the indicated value.

In most AWMZs reducing the amount of inorganic fertilizers and more effectively using the nutrients in manure significantly reduces the surplus nitrogen. The cropped area over which zonal balances exceed 100 kg/ha is reduced to 19% from 57% and the area where balances exceed 50 kg/ha is reduced to 44% from 78%.

Improving feed rations decreases the cropped area with a zonal balance greater than 100 kg/ha to 10% and that greater than 50 kg/ha to 19%. However, even with both improved management scenarios in place, the area over which the estimated zonal balance exceeds 300 kg/ha is 4% of the total LFV cropped area .

Figure 6

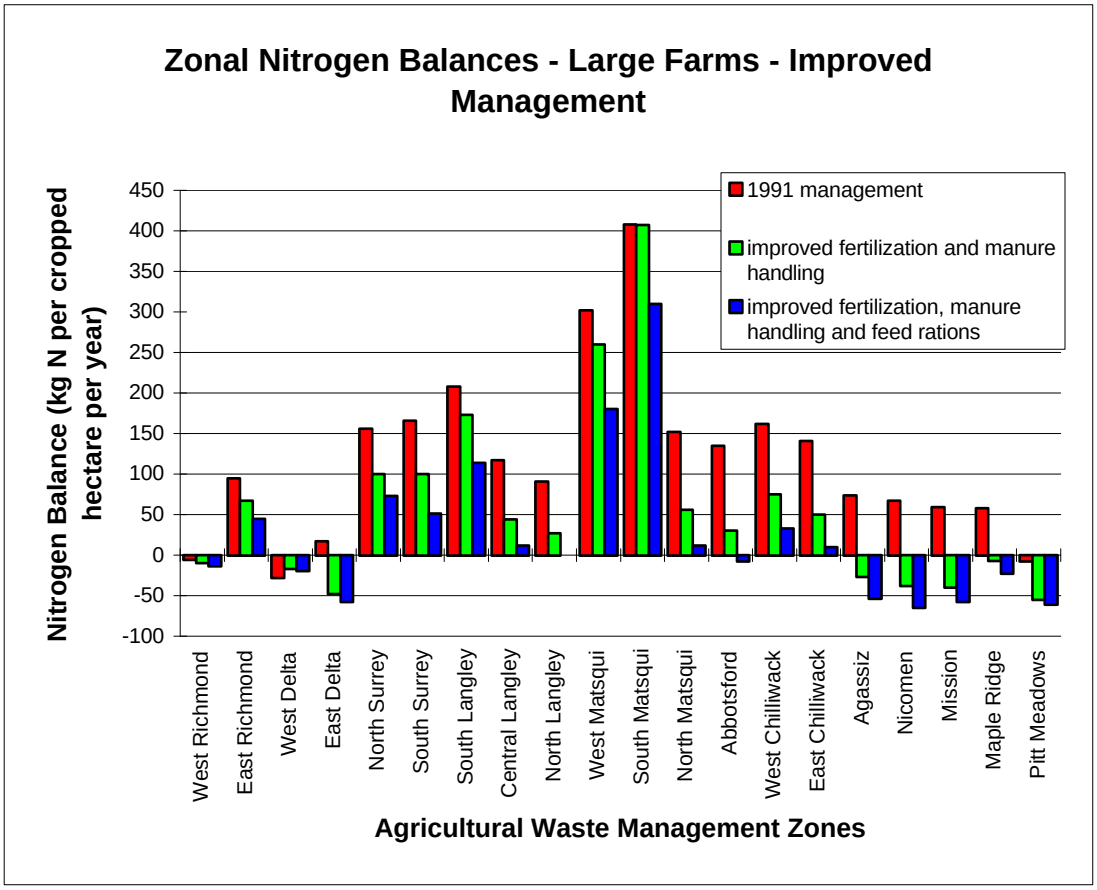


Figure 7

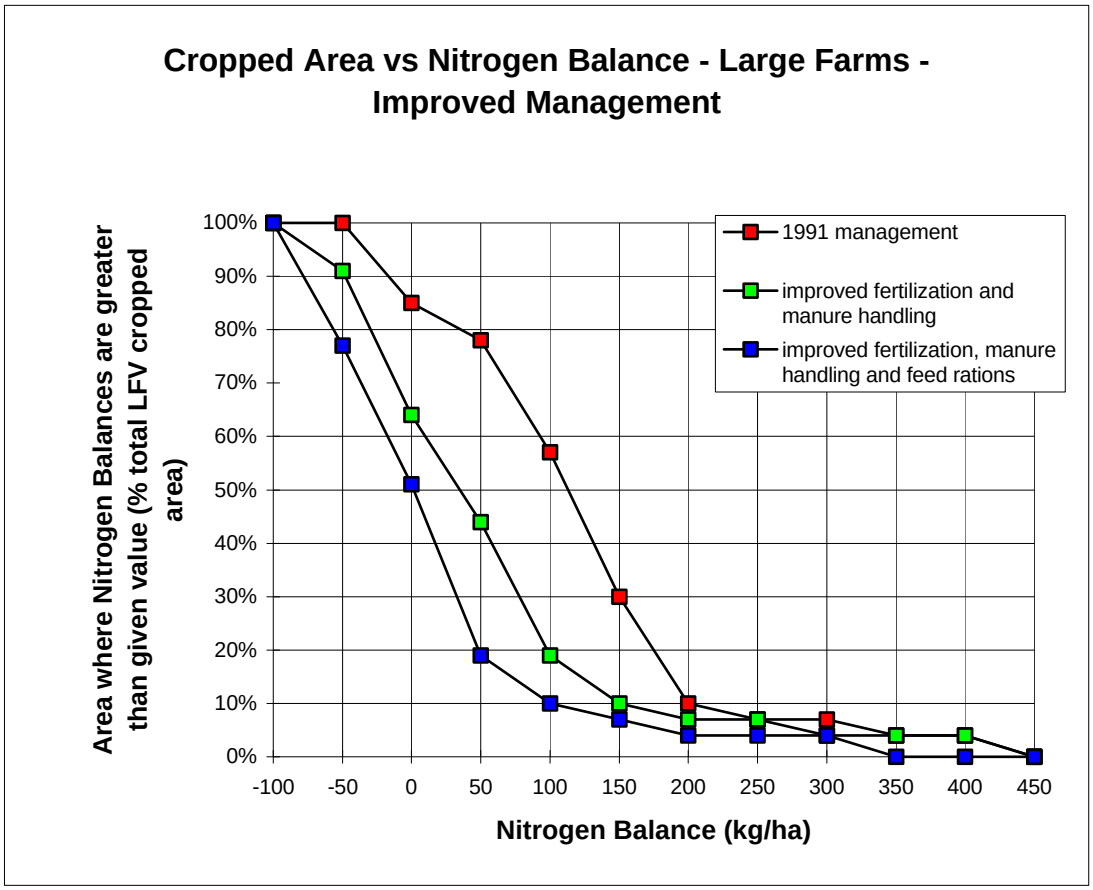


Figure 8

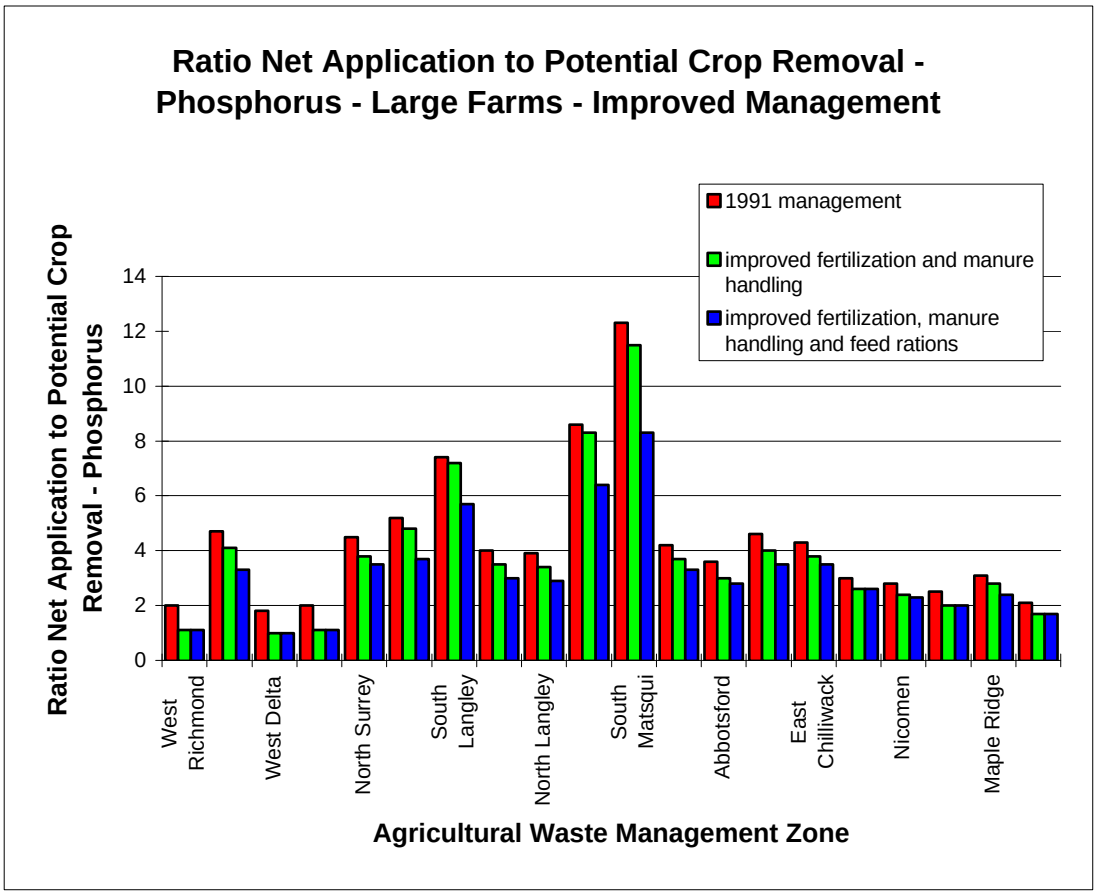
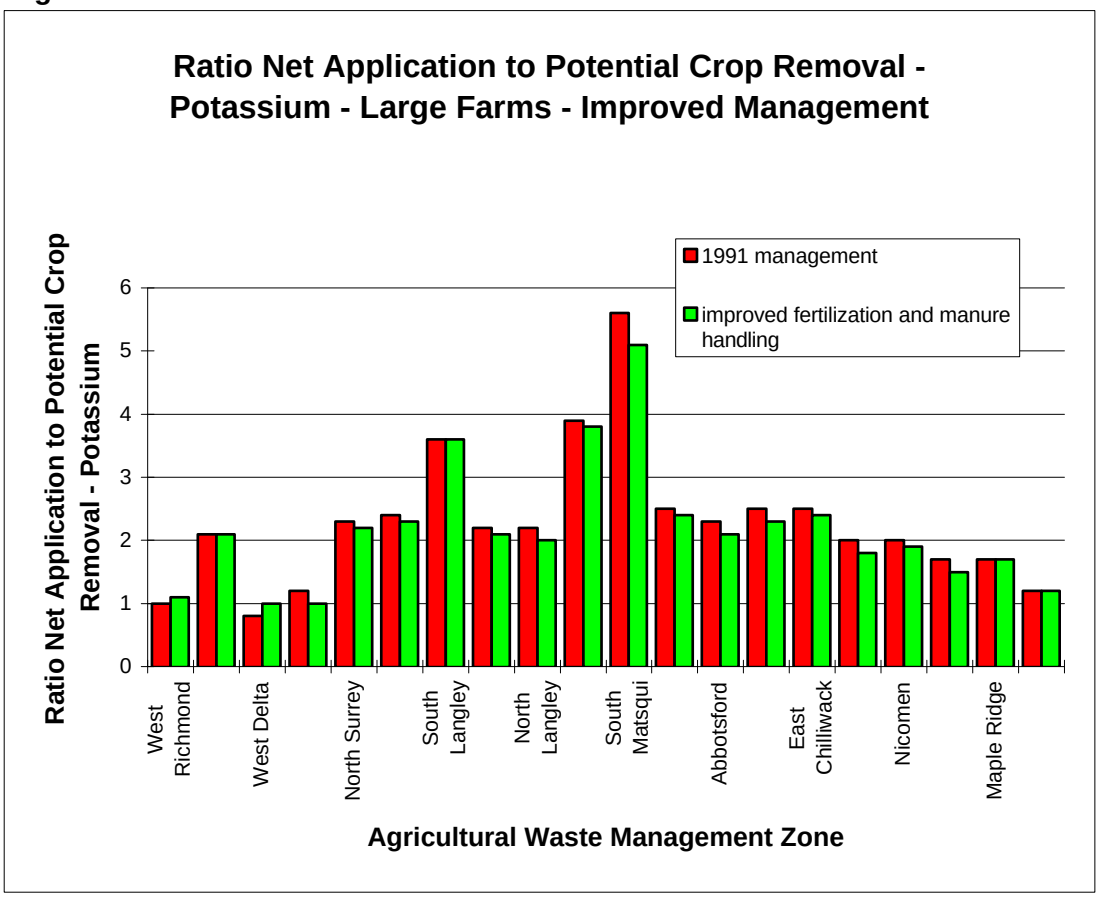


Figure 9



Phosphorus balances are reduced but applications remain well above crop removal rates in most cases. It is believed that phosphorus is the limiting nutrient in most healthy BC coastal streams which means that adding more phosphorus may well lead to increased algal growth. The significance of the estimated phosphorus balances has not yet been considered in detail.

With reduced fertilizer applications and improved manure handling potassium applications also remain well above crop removal rates. The improved feed ration scenario which was modeled assumed that there would be no change in the amount of potassium excreted, although feed rations and feeding strategies can be modified to reduce the amount of potassium excreted as well. If potassium applications occur at the rates indicated in Figure 9 soil potassium levels and the related animal health problems will continue to get worse.

These estimates indicates that improvements within the farm gate can significantly reduce the nutrient loading problem but it is not the total solution.

The nutrient management problems can therefore be considered to fall into two general categories; one where the problems can be solved by improved on-farm management (such as reduced use of commercial fertilizers, improved manure handling and improved feeding strategies) and a second where the problems cannot be solved through on-farm management changes alone (the animal densities are simply too high relative to the crop removal rates).

7.0 PRACTICES AND LEGISLATION ELSEWHERE

In looking at what has been done in other jurisdictions two major points became evident;

- BC is not alone in searching for innovative ways to address the problems associated with livestock waste management and receiving environments, and

- there is no one model elsewhere that can be considered as a prototype for addressing livestock waste management issues in the Lower Fraser Valley. However, experience elsewhere should help with developing a "made in" the Lower Fraser Valley livestock waste management planning policy.

Other considerations which came to light were:

- In areas of intensive livestock production in Europe, USA and Canada waste management and associated environmental considerations are becoming increasingly key public policy issues.

- Approaches to livestock waste management practices, legislation, regulation and policy are extremely dynamic at the present time. Changes result from new research findings, applied experience, industry economics and integration with other environmental and land use planning policy.

- Governments, agencies and farmers are struggling with intensive livestock waste management issues, but with so many areas of concern and such a diverse and complicated system, the best solutions to these problems remain to be found.

- Actions taken elsewhere, to date haven't necessarily remedied the problems, but rather attempted to abate the problems while searching for other answers.

- Any consideration of off-farm central processing of livestock waste must be exposed to rigorous economic and technical analysis as a result of unfavourable experiences elsewhere.

- A priority must be given to educate the producer, government resource manager and the public.

8.0 OPTIONS TO THINK ABOUT

In looking at the options for improving agricultural waste management in the Lower Fraser Valley it must be kept in mind that we are dealing with a diverse and complicated system. The public is concerned about water and air quality and it is expected that there will be continuing pressure for a reduction in the environmental impacts caused by agriculture.

We are dealing with non-point source (NPS) pollution, pollution which originates from several diffuse sources. Loadings from individual sources may not be large but in total can be very significant and it has been shown that such loadings from agriculture are significant in many areas of the Lower Fraser Valley. This type of pollution is difficult to regulate.

In attempting to reduce NPS pollution, and more particularly nutrient loading from agriculture, there will be trade off between regulation and voluntary action. The more that agriculture understands the problems and makes progress the less need there will be for strict regulation. On the other hand there is the need for some amount of regulation to ensure that producers will not use obviously inadequate management practices.

We need to find the appropriate balance between our environmental, economic and social needs. Producers are certainly part of the solution and it is recognized that significant improvements have been made by producers, particularly in the past few years.

In order to make progress towards an acceptable solution the tools must be available; educational tools, financial tools and regulatory tools.

The tools must work toward:
- **stabilizing** nutrient loadings (preventing the problems from getting any worse),
- **reducing** the loading in areas where this is necessary, and
- achieving **sustainability** (an acceptable long term nutrient balance).

Options worth considering will include one or several of the following components:

- research
- development
- extension
- financial incentives
- legislation / regulation
- enforcement

The objective of long term sustainability can only be achieved over a period of years, to achieve this we must continue working on the problems and continue refining the objectives and choosing the appropriate tools as we go along.

The following table presents a summary of options for improved nutrient management which have been suggested or tried elsewhere. Some of these may be a practical option for our situation and will form the basis for further dialogue and action.

Table 1 **OPTIONS TO THINK ABOUT**

1. STABILIZATION -prevent problems from getting worse

ON FARM	REGIONAL
to obain a building permit	
new manure storage structures (including earth lagoons) - require proper design (no leakage, runoff) - minimum capacity specified	livestock density increases controlled where required (quotas tied to land base) maintain agricultural land base water quality monitoring to better define sensitive areas
new or expanding operations - require Best Agricultural Waste Management Plan or Nutrient Management Plan	

2. REDUCTION - improve nutrient management on all farms

ON FARM	REGIONAL
no runoff or leakage from any manure storage	transport manure to "deficit" areas "manure bank system"
adequate capacity for all manure storage	develop new "markets" for manure
all farms have a Best Agricultural Waste Management Plan or Nutrient Management Plan	ticketting proceedure for non-compliance with Code
match manure applications to crop needs	reduce livestock populations specify maximum animal densities
increase crop removal of nutrients	more land available for manure spreading
reduce use of inorganic fertilizers	waste management permits required
reduce nutrients in manure (improved feeding strategies)	off-farm central processing of manure
proper timing of all manure applications	restrict farming activities in environmentally sensitive are
implement conservation farming practices relay cropping cover cropping	order that ecological damage be made good water quality monitoring to determine effectiveness of efforts
reduce ammonia emissions	regulate times when manure cannot be spread
vegetated buffer strips along watercourses	regulate minimum manure storage capacities

3. SUSTAINABILITY - maintain an acceptable level of nutrient management

ON FARM	REGIONAL
all farms complying with a Best Agricultural Waste Management Plan or Nutrient Management Plan	continued water quality monitoring livestock densities to increase only where an acceptable equilibrium can be maintained maintain or enhance agricultural land base

APPENDIX C

WORKSHOP AGENDA

PRESENTATION ABSTRACTS

Producer Workshop
Management of Agricultural Wastes in the Lower Fraser Valley

Workshop Objectives:

present the results to date of the Management of Agricultural Wastes in the Lower Fraser Valley program

discuss options for improving the management of agricultural wastes

obtain responses to study findings and opinions on management policy options from producer representatives

Invitation to Participate:

Since producer group input to waste management improvement options will assist policy makers in making informed and realistic decisions, the Province requests and encourages your participation in the workshop scheduled for February 28, 1996.

Background Information:

projects The management of Agricultural Wastes in the Lower Fraser Valley program has included a series of projects which have considered agricultural waste management, primarily nutrient management (manure and inorganic fertilizers).

committee The program is being conducted under the guidance of an interagency; intergovernmental Steering Committee which includes representatives from BC Environment; BC Ministry of Agriculture; Fisheries and Food; Environment Canada; Fisheries and Oceans, Canada; BC Federation of Agriculture and the UBC Westwater Research Centre.

Stats Canada An inventory of livestock and poultry and of the agricultural land base has been developed, based on the 1991 Census of Agriculture and Waste Management Surveys conducted by various commodity groups in 1990 and 1991.

model A nutrient budgeting model has been developed which estimated production of manure nutrients and the use of inorganic fertilizers and the losses of nutrients to surface water, groundwater and the atmosphere. This model has been used to estimate the impacts of nutrient management under 1991 conditions and under several improved management scenarios.

elsewhere A review of policies and regulations which have been developed and tried in various jurisdictions around the world has been completed.

Discussion of Program Findings:

intensive Agricultural production throughout much of the Lower Fraser Valley is intensive and there is a legitimate concern over the impacts of agricultural nutrient management on our water, soil and air resources. In many cases nutrient management practices have not been adequate to provide an acceptable level of protection for the environment.

excesses Analysis of nutrient management practices shows that over much of the Lower Fraser Valley nutrients are applied well in excess of crop needs and that the ability of the agricultural land base to adequately utilize the manure which is generated, even if manure is moved from areas of excess to areas of deficit, is limited.

recycle Land application of manure during the non-growing season has often been perceived to be a cost effective solution to manure management since less storage capacity is required, unfortunately this practice results in the loss of much of the applied nitrogen to surface or groundwater. Increased manure storage capacity allows for better utilization of manure nutrients, which in turn reduces the need for inorganic fertilizers and reduces the loss of nutrients to water.

land use Analysis of 1971,198l and 1991 data for the area above the Abbotsford aquifer shows that along with a shrinking agricultural land base, dramatic changes in land use have significantly reduced the capacity of the land to effectively utilize nutrients. Much of the area which had been in grass is now used for raspberry production and a raspberry crop may only remove one tenth of the amount of nutrients as a well managed grass stand. Similar land use changes in other areas could have major impacts on manure management options.

Further Action:

Further improvements to agricultural nutrient management is required to protect and improve the quality of our water, soil and air resources. Strategies are required which will provide:

stabilization: prevent increases in nutrient losses from agriculture and further reductions in the agricultural land base

reduction: reduce nutrient losses from agriculture where required

sustainability: allow realistic levels of agricultural productivity while providing an adequate level of protection for the environment

A necessary step in any further work is consultation with agricultural producers. The scheduled workshop provides an opportunity for producer group representatives to provide input on options for improving agricultural nutrient management.

Workshop proceedings will present the options discussed and will document the comments of the participants. This information will be included in a final report which will be submitted to the executive of BC Environment.

Producer Workshop:

Date: Wednesday, February 28, 1996

Time: a.m.

Location: 34194 Marshall Road
Abbotsford, BC
(the old Abbotsford City Hall)

For further information contact:

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fax: (604) 953-3856

Rick Van Kleeck
BC Ministry of Agriculture, Fisheries & Food
Abbotsford Agricultural Centre
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V3G 2M3
phone: (604)1556-3108
fax: (604)

ERH/mc
WORKSHOP OBJECTIVES

Surface Water Quality:

Agriculture, Fish Issues, and a Case Study in Matsqui, B.C.

Background:

The Matsqui Slough watershed is located in the lower Fraser Valley, near Abbotsford, B.C. It drains an area of about 4200 hectares and is generally flat with elevations of 5 to 8 meters above sea level. The drainage area supports dairy, poultry, sow. cole crop, and blueberry production. in addition to some nurseries. Agriculture is virtually the only land use in the watershed except for **a** relatively small urban area located in **a** headwater tributary. The Matsqul Slough system sustains a population of coho salmon. Adult who return to spawnlng grounds in Clayburn Creek during the fall months when large amounts of manure have traditlonally been spread on bare fields, and when typically heavy rainfalls result in manure runoff and leaching of dissolved nutrients.

In 1994 **a** study was undertaken to document the level of compliance of each livestock farm in the Matsqu i Slough Watershed with the Agriculture Waste Control Regulation. In addition, a water quality monitoring program was established. Water was sampled from 8 sites located between the headwaters of the watershed and the confluence with the Fraser River. Samples were collected once per week for six weeks each spring and fall for three years.

Key findings: Water quality conditions in the relatively undeveloped headwaters were good, with low nutrient concentrations and high 'levels of dissolved oxygen. Water quality conditions detetiorated moving downstream through agricultural lands.

Nitrates serve as a good indicator of nutrient contamination from manure. Concentrations increased from less than 1 ug/l In headwaters, to approximately 4 ug/l at downstream sltes. Downstream sites always had lower dissolved oxygen concentrations than headwater sites. Oxygen saturation levels at downstream sites were often well below levels required to sustain salmonids particularly during fall months when adult who return to spawn. Depending upon circumstances each fall, these low oxygen saturation levels In the tower watershed can effectively form an environmental barrier to the coho Spawning migration and therefore threaten the coho population.

Water quality sampling was conducted in a number of other streams in agricultural areas near Matsqui Slough, and provided evidence of similar water quality Impacts.

Agriculture contributes both directly and indirectly to the oxygen depletion problem in the Matsqui watershed. Manure runoff contains organic matter which consumes oxygen as it decomposes. In addltlon. nutrients run off/leach from fields, reaching surface waters where they cause excessive algal growth. When algae die in the fall. oxygen is consumed from surface waters in the decomposition process (oxidation reactions). Excessive algai growth can also cause oxygen depletion at night when Oxygen requirements exceed the amount of oxygen produced in photosynthesis.

Implications:

Results highlight the need for improved nutrient/manure management practices in the Lower Fraser Valley. The Impacts of agriculture on water quality which were documented in thls study are likely widespread in agricultural areas of the Lower Fraser Valley. Approximately 60% of Fraser River coho Salmon spawn in small tributaries to the Fraser downstream from Hope. Water quality conditions during fall months In streams which drain agricultural lands can potentially prevent adult salmon from completing their spawning migration. Although water quality conditions were not monitored on a year-round basis, results of the present study give rise to additional concerns. Juvenile who spend a minlmum of approximately one year rearing in small, freshwater streams before migratlng to sea. In agricultural areas these small streams are often completely surrounded by agricultural land uses which can impact water quality on a year-round basis. Degraded water quality can therefore the amount of habitat available for who rearing, and limit the carrying capacity of these small streams, further threatening these sensitive populations.

Agricultural Impact on Surface Water Quality in the Sumas River Basin

Hans Schreier and Caroline Berka, Institute for Resources and Environment, University of British Columbia, Vancouver, B.C. V6T 1Z3

A b s t r a c t :

The Sumas Prairie contains some of the most productive agricultural land in Canada and although the farmland is protected from urban development by the Agricultural Land Reserve (ALR), a new issue has arisen from within the agricultural community. Intensification of agriculture is resulting in excess application of nutrients and chemicals and this is having a detrimental impact on local streamwater and groundwater resources in the watershed. A three year study was carried out to document the land use changes and intensification of agricultural land use and its impact on water quality. The land use changes were documented from agricultural census data, from a waste management survey, and from evaluations of historic aerial photos and field work. Stream water quality was monitored over a two year cycle at 16 stations. All information was placed into a Geographic Information System (GIS) and the relationships between land use and water quality were determined using statistical techniques and by determining surplus nitrogen applications and animal stocking densities in relation to stream water quality.

The results showed that the agricultural land base has stayed the same but hog and poultry numbers have increased dramatically between 1986 and 1991. Similarly, the number of new buildings has steadily increased between 1953 and 1995. All agricultural land use indicators point towards more intensive animal operations on a fixed land 'basis leading to excess manure applications. The watershed was divided into contributing areas and the detailed nitrogen surplus calculations for the contributing areas in the watershed ranged between 57 and 332 kg/ha N/farmed hectare. Similarly animal stocking densities ranged between 0.4 to 4.5 Animal Unit Equivalents and three contributing areas had values above the 2.5AUE, an index considered the maximum carrying capacity for nitrogen management per hectare in a number of European countries. The areas with the highest surplus nitrogen and highest stocking densities were also the areas where the streamwater problems were the greatest. Water quality was impacted in two ways. In Marshall Creek., groundwater contributions from the Abbotsford aquifer are significant and dominate the stream flow during the summer. It is during this period when the creek reached the greatest nitrate levels. In contrast, the remainder of the Sumas River watershed is unaffected by the Abbotsford aquifer and the nitrate, phosphate and ammonia problems in the stream water were highest during the winter period. Surface run-off from excess nutrients during this time period is considered the source of streamwater contamination. As a result of excess nutrient input, dissolved oxygen levels are frequently below acceptable levels for fish and aquatic biota and this at a time when salmon return to the the headwater streams for spawning.

Source control is the most effective option to improve the aquatic environment and it is suggested that nutrient management be made more effective by a) reducing fertilizer use, b) restricting manure applications during late fall when the stream water quality is already impaired, c) reduce manure applications by exporting surplus material to nitrogen deficit areas, d) regulate stocking densities to levels that are considered within the carrying capacity of the soil.

Impact of Changes in Agricultural Land Use on Nitrogen Loading to the Abbotsford Aquifer

B.J. Zebarth and J.W. Paul
Pacific Agriculture Research Centre (Agassiz)
Agriculture and Agri-Food Canada

The Abbotsford Aquifer, also referred to as the Sumas Aquifer in Washington State, is the largest and most heavily used in the Lower Mainland of British Columbia. Nitrate concentrations in a significant portion of the aquifer are greater than the 10 mg N / L maximum acceptable concentration of the Canadian Drinking Water Guidetine. Based on previous work, we know that agricultural production over the aquifer makes a substantial contribution to nitrate loading of the aquifer.

Based on the model used by Pat Brisbin, and using 1971, 1981 and 1991 census data, the following conclusions were drawn:

1. Nitrogen loading to the aquifer from agricultural production is high.

Applications of nitrogen to the root zone are substantially greater than nitrogen removals from the root zone for cropped land over the Abbotsford Aquifer. As a result, the risk of nitrate leaching associated with agricultural production in this area is very high. The nitrogen surplus is sufficiently large to account for much of the elevated nitrogen concentrations measured in the groundwater.

2. Nitrogen loading to the aquifer from agricultural production is increasing over time.

The surplus of nitrogen additions to the root zone over nitrogen removals from the root zone increased substantially from 1971 to 1991. The rate at which the surplus is increasing is somewhat dependent on the assumptions used. Regardless of the assumptions used, however, the surplus is increasing rapidly over time.

3. It is important to take a holistic approach when addressing groundwater contamination issues.

The increase in nitrate loading to the aquifer was primarily as a result of changes in land use on the balance of nitrogen inputs and removals from the soil root zone. Calculated nitrogen inputs to the soil actually decreased slightly during this period. The land in agricultural crops decreased during this 20 year period. There was also a shift away from dairy and beef operations, which require a local land base for crop production and grazing, to increased poultry production, which does not require a local land base for crop production. This shift also resulted in a reduction in area used to produce the high nitrogen removal crops used in these dairy and beef operations and an increase in the area used to produce small fruit crops which have a low nitrogen removal value. Without a holistlc approach, these complex interactions would likely not have been identified.

Livestock Waste Management Practices and Legislation
Outside British Columbia

G. Gary Runka
G.G. Runka Land Sense Ltd.

The key problems identified from experience elsewhere include:

* the underlying public concern with manure management and its pollution and potential pollution risks associated with air, water, habitat and soil resources;

* large quantities of manure have been applied to a limited land area often without considering the potential hazards; and

* most emphasis appears to be on potential water pollution and a focus of concern on the decreasing quality of drinking water.

Problems directly associated with manure management are similar in many locations, what differs is the practices to deal with the problems.

The review of legislation, regulation and policy elsewhere should be considered a "snapshot in time" as the various governmental approaches to livestock waste management are extremely dynamic at this time in Europe and the USA.

While we cannot expect to extrapolate from the experience of another jurisdiction directly and apply it to the Fraser Valley, the combination of experiences elsewhere are helpful in that they provide various policy approaches - some successful, other not.

Lessons learned include:

In areas of intensive livestock production in Europe, USA and Canada waste management and associated environmental considerations are becoming increasingly key public policy issues.

Approaches to livestock waste management practices, legislation and regulation and policy are extremely dynamic at the present time. Changes result from new research findings, applied experience, industry economics and integration with other environmental and land use planning policy.

BC is not alone in searching for innovative ways to address the problems associated with livestock waste management and receiving environments.

There is no one model elsewhere that can be considered as a prototype for addressing livestock waste management issues the Lower Fraser Valley. However, experience elsewhere should help with developing a "made in" the Lower Fraser Valley livestock waste management planning policy.

Governments, agencies and farmers are struggling with intensive livestock waste management issues, but with many areas of concern and such a diverse and complicated system, the best solutions to its problems remain to be found.

Actions taken elsewhere, to date haven't necessarily remedied the problems, but rather attempted to abate the problems while searching for other answers.

Any consideration of off-farm central processing of livestock waste must be exposed to rigorous economic and technical analysis as a result of unfavourable experiences elsewhere.

A priority must be given to educate the producer, government resource manager and the public.

SUSTAINABLE POULTRY FARMING GROUP

Kevin Chipperfield, P.Ag.
SPFG Program Coordinator and Advisor
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Executive Summary

The Sustainable Poultry Farming group consists of representatives from each of the four major poultry associations in the Fraser Valley, namely the B.C. Chicken Growers', B.C. Turkey, F.V. Egg Prod. and B.C. Broiler Hatching Egg Prod. Associations. Since its inception, in January 1991, the group has progressively identified, studied, and acted on environmental issues.

In the Spring of 1994 work continued through funding from the Greenplan for Agriculture (67%) and poultry producers (33%). The Sustainable Poultry Farming Group began its work to find creative ways to implement some of the research findings of previous years work. The work plan for the group consisted of four main areas:

1. further develop alternate manure markets, both local and distant;
2. develop a least-cost loading and transport method to service distant markets;
3. provide a service to poultry and crop producers that will allow the coordinated hauling of manure from poultry farms and delivery to crop farms
4. develop an overall manure transport program that will boost the adoption of manure hauling services and activities from poultry farms to distant markets.

To best implement the work plan, project development and direction have been pursued in the following ways:

A) Local and Distant Market Development

Projects were developed in various alternate local market areas. As in previous years, local projects were conducted with the nursery industry. As well, contacts were developed with Bioremediation consultants to establish the use of manure as a remedial amendment. Other projects include the development of improved, manure application technology to further the common interests of poultry and crop producers who wish to utilize the full nutrient value from a consistent and even manure application.

The development of distant markets has been enhanced considerably. In Delta, a demonstration least-cost manure storage facility was built on a cooperating farm. This facility has been instrumental in establishing Delta producer support for the use of poultry manure and a commitment from the poultry industry that manure transport to Delta will occur. In other areas outside the Fraser Valley, manure transport has also occurred. During the fall and winter of 1995/96, a new market was developed in the Keremeos area of B.C. with 'organic' farmers. In addition, this spring promises to see new markets opening up in the Merritt, Ashcroft, and 100 Hundred Mile House areas of B.C.

B) Least-Cost Manure Loading and Hauling Systems

Since manure hauling can be a very expensive undertaking when using the traditional small scale manure trucks, it was appropriate to determine how this type of hauling could changed. The challenge was to be able to find a system that would allow at least some of the advantages of bulk commodity transport and could be adapted to the farm level.

During the winter of 1995, a manure hauling method using bulk container bins was evaluated as a potentially cost-effective method for poultry producers to handle and haul manure to distant markets. This approach was successful from a handling aspect, but less so from a cost standpoint. Since the container bin system cost was slightly higher than producers wanted to pay, the group decided to try using large 'B-Train' type trucks. In order to do this, an on-farm conveyor system capable of being moved from farm-to-farm was necessary to. load trucks of this size. In the fall of 1995, poultry producers and the Fraser River Action Plan contributed funds to build a such a suitable system.

C) Poultry and Crop Producer Coordination Service

By 1995, with the advent of new distant markets, the next step for the group was to provide a service that would match poultry manure supply with crop producer demand as well as coordinate the transportation of manure from one farm to another. One important aspect provided through this service is that of developing and maintaining manure markets. Markets can vary substantially with crop and fertilizer prices. Through constant attention to markets, it is believed that these problems can be accounted for and to some extent minimized. If large-scale manure transport is to occur, a service to ensure manure market connections are made is considered very important.

D) Groundwater Protection Program (GPP)

For distant manure hauling to occur in some sort of unified manner, a program with a positive image was enacted in June 1995 for the Abbotsford Aquifer area. This program was named the "Groundwater Protection Program". Individual farmers involved are designated as groundwater protection cooperators. Four essential components for this program are:

1. Groundwater protection cooperators
2. On-farm conveyor and trucking to 'alternate (distant) markets
3. Viable distant markets - Delta, B.C. interior, Washington state
4. Coordinating body - role provided by the SPFG

In Summary

Alternate local manure markets have been expanded and include areas of significant potential manure use such as Bioremediation. In terms of distant markets, the GPP shows great promise after 8 months operation and is expected to provide the framework for future manure hauling activities to such distant markets. By the end of the first year of operation, expectations are for approximately 6 - 8,000 cubic yards of poultry manure to be hauled to distant locations.

The GPP has worked well to provide a forum for personal farm contact, which has been very effective toward inducing changes in producer attitudes and soliciting support for manure hauling activities. Before manure hauling services were available, there was no option available to poultry producers, so that in some cases less attempt was made to deal with environmental pressures.

In the future, distant market development and manure hauling is expected to progressively increase, however further project success will require some form of government funding to provide:

- a portion of the baseline funding for Sustainable Poultry Farming Group activities;
- a capital funding pool for investment into sensible, cost-effective environmental initiatives.

HOG PRODUCERS' SUSTAINABLE FARMING GROUP

Summary of Activities
for the Workshop by MELP

The Hog Producers' Sustainable Farming Group is actively seeking solutions for the hog producers to better manage their manure. Efforts were made to promote better nutrients management; to promote more storage, to investigate new technologies for nutrients removal and to gather information to support better manure handling practices. Experiences have been gained over the last several years in liquid/solids separation, biological treatment of slurry, composting of solid'manure and the use of it, slurry application rate to crops, pit covers, etc. Some of the findings have, or will, be applied to farm operations.

In the fiscal year of 1996/199,, the HPSFC will investigate an integrated system to recover nutrients and recycle water, composting with enhanced evaporation, water removal by composting broiler litter and hog slurry, manure application rate to grass land, evaluation of individual farm, pit covers, etc..

We have to realize that to find the right solution always takes time and effort. However, with emerging technologies, we are confident that the manure issue can be improved, it is just a matter of time.

APPENDIX D

WORKSHOP QUESTIONNAIRE

MANAGEMENT OF AGRICULTURAL WASTES IN THE LOWER FRASER VALLEY

Form #

PRODUCER WORKSHOP - FEBRUARY 28 1996

BREAK OUT GROUP QUESTIONNAIRES

Commodity: _____ Agricutural Waste Management Zone: _____

Name (OPTIONAL): _____

	STRONGLY DISAGREE	DISAGREE	UNSURE	AGREE	STRONGLY AGREE
SCORE	1	2	3	4	5
		TICK BOX BELOW			

SECTION A - GENERAL

1) The following type of pollution is occurring in agricultural areas:

- 1a. AIR
- 1b. WATER
- 1c. SOIL

2) Agriculture is an important contributor to pollution:

- 2a. IN ALL AREAS OF THE LOWER FRASER VALLEY
- 2b. CERTAIN AREAS OF THE FRASER VALLEY

3) Agriculture will need to do more than it is currently doing if environmental problems are to be resolved:

4) Sustainable agri-food systems are " those that are economically viable, and meet society's need for safe and nutrious food, while conserving or enhancing natural resources and the quality of the environment for future generations:

SECTION A - COMMENTS

SECTION B - STABILIZATION

Form #

	STRONGLY DISAGREE	DISAGREE	UNSURE	AGREE	STRONGLY AGREE
SCORE	1	2	3	4	5
		TICK BOX BELOW			

5) To keep problems from getting worse, all new or expanding farms first need to demonstrate they are sustainable:

OPTIONS & COMMENTS

SECTION B continued.....

Form # 42

	STRONGLY DISAGREE	DISAGREE	UNSURE	AGREE	STRONGLY AGREE
SCORE	1	2	3	4	5
		TICK BOX BELOW			

6) Local governments should be responsible for restricting land use changes which would limit agriculture:

OPTIONS & COMMENTS

SECTION C - REDUCTION

Form #

	STRONGLY DISAGREE	DISAGREE	UNSURE	AGREE	STRONGLY AGREE
SCORE	1	2	3	4	5
		TICK BOX BELOW			

7) To reduce problems all farms need to show they are sustainable by:

7a. Developing Nutrient Management Plans.
7b. Developing Best Agricultural Waste Management Plans.
7c. Modifying feed rations.
7d. Demonstrating conservation farming practices.

OPTIONS & COMMENTS

SECTION C continued....

Form # 42

	STRONGLY DISAGREE	DISAGREE	UNSURE	AGREE	STRONGLY AGREE
SCORE	1	2	3	4	5
		TICK BOX BELOW			

8) Surplus manure (nutrients) should be:

8a. Moved to deficit areas.

8b. Managed with on-farm treatment and moved to:

- Agricultural areas with deficit.
- Non-agricultural areas.

8c. Managed with central treatment and moved to:

- Agricultural areas with deficit.
- Non-agricultural areas.

OPTIONS & COMMENTS

SECTION C continued....

Form #

	STRONGLY DISAGREE	DISAGREE	UNSURE	AGREE	STRONGLY AGREE
SCORE	1	2	3	4	5
		TICK BOX BELOW			

9) Change existing environmental regulations to reduce likelihood of pollution:

OPTIONS & COMMENTS

SECTION C continued....

Form # 42

	STRONGLY DISAGREE	DISAGREE	UNSURE	AGREE	STRONGLY AGREE
SCORE	1	2	3	4	5
		TICK BOX BELOW			

10) Increase effort to educate, demonstrate and encourage sustainable farming:

OPTIONS & COMMENTS

SECTION C continued....

Form #

	STRONGLY DISAGREE	DISAGREE	UNSURE	AGREE	STRONGLY AGREE
SCORE	1	2	3	4	5
		TICK BOX BELOW			

11) The economic responsibility for environmental compliance lies with:

- 11a. Individual.
- 11b. Industry/commodity.
- 11c. Government.
- 11d. Consumer.
- 11e. Combination of all of above.

OPTIONS & COMMENTS

SECTION D - SUSTAINABILITY

Form # 42

	STRONGLY DISAGREE	DISAGREE	UNSURE	AGREE	STRONGLY AGREE
SCORE	1	2	3	4	5

TICK BOX BELOW

12) The evaluation of whether agriculture is approaching sustainability is the responsibility of:

- 12a. Industry/commodity.
- 12b. Government.
- 12c. University/third party.
- 12d. Combination of all of above.

OPTIONS & COMMENTS

SECTION E - TIMEFRAMES

Form #

STABILIZATION - COMMENTS

Circle the most appropriate timeframe.

1 yr	1-3 yrs	1-5 yrs	1-10 yrs

REDUCTION - COMMENTS

Circle the most appropriate timeframe for.

1 yr	1-3 yrs	1-5 yrs	1-10 yrs	>10 yrs

SUSTAINABILITY - COMMENTS

Circle the most appropriate timeframe for.

1 yr	3 yrs	5 yrs	10 yrs	>10 yrs

APPENDIX E

WORKSHOP ATTENDANCE

Attendance at Management of Livestock and Poultry Manures in the Lower Fraser Valley, Producer Workshop, February 28, 1996.

Ron Bertrand	BCMAFF
Jennifer Wohl	UBC - Agricultural Economics
Ted Haughton	BCMELP
Harry Neumann	Dairy
Michael Soth	Pork
David Chilvers	Pork
Kevin Chipperfield	Sustainable Poultry Farming Group
Auke Elzinga	Dairy
Al Fadden	Dairy
Ben Brandsma	Dairy
Jim van Dongen	Dairy
J.C. Yu	Hog Producers' Sustainable Farming Group
Grant Kowalenko	Agriculture and Agri-Food Canada
Jerry Gelderman	Pork
Jennifer Nener	DFO
Ray Nickel	Turkey
Rick Van Kleeck	BCMAFF
Daryl Arnold	BC Chicken Marketing Board
Gorden Ferguson	BC Milk Producers' Association
Ed Kielstra	Dairy
Ben Cuthbert	BC Milk Producers' Association
Doug Parker	Delta Farmers' Institute
Orlando Schmidt	Dairy Producers' Conservation Group
Bev Locken	BCMELP
Brad Reid	BC Broiler Hatching Egg Association
Kelly Der	GVRD
Don Livingston	Dairy
Bill Oldham	Horse Council of BC
Hans Schreier	UBC - Westwater
John Paul	Agriculture and Agri-Food Canada
Liz Freyman	BCMELP
Harv Janzen	BC Egg Producers' Association
Dimity Hammon	BC Association of Cattle Feeders
Hugh Liebscher	Environment Canada
Bernie Klinger	Dairy
Dean Rochon	Poultry
Marg Crowley	BC Federation of Agriculture
George Derksen	Environment Canada