Alberni-Clayoquot Regional District

Abattoir Feasibility Study

FINAL REPORT

April 20, 2016

Janco Associates Business Consulting
215 Canvasback Place
Salt Spring Island,
British Columbia,Canada
V8K 2W5

m.coates@shaw.ca

SSI Telephone (250) 537-8527

Funding for the project provided in part by:

Agriculture and Agri-Food Canada (AAFC) and the BC Ministry of Agriculture through the ***Investment Agriculture Foundation of BC***

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1.0 INTRODUCTION

In 2011, the Alberni-Clayoquot Regional District completed an agricultural plan which documented the status of the agricultural industry in the region. It noted that the agricultural sector was relatively small with 89 farms and 3171 hectares (7832 acres) that were currently farmed. The acreage farmed represented about 41% of the land in the Agricultural Land Reserve (ALR)

Livestock production dominated, with 90% of the farmed land devoted to the raising of livestock. According to the report, the Alberni Valley produced between 5 and 11% of the volume of food consumed by locals.

The production of livestock is in decline, a major part of which is due to the near disappearance of the local dairy industry. The BC meat Inspection Regulation which was adopted in 2004 also had an impact on livestock production as it restricted local sales of meat to consumers by requiring meat to be processed in a licensed abattoir.

There is one licensed abattoir in the Alberni valley which does poultry (Al's Feathers Be Gone) but there is no licensed red meat plant. Vancouver Island has a number (7) of Class A licensed abattoirs but their locations are not conducive to utilization by ACRD area farmers. The one-way distances range from 85 to 200 kilometers (51 to 120 miles) and 2 return trips are typically required for each processing order.

Livestock producers in the area are facing increasing demand for quality locally produced meat. Local processing is a key requirement. As noted in the RFP, "the lack of a local abattoir facility has been identified as a key roadblock" for the livestock industry. Other communities have shown significant increases in livestock production when a local abattoir is available. The Alberni-Clayoquot Regional District (ACRD) in cooperation with the local farming community has

therefore commissioned a feasibility study to assess the potential viability of a local abattoir. Janco Associates Business Consulting was awarded the contract for this assignment via the tender process.

2.0 SCOPE OF WORK

As per the RFP, the scope of work is:

- Explore current level of livestock production in the ACRD.
- Calculate a projection of the total capacity for livestock production in the ACRD.
- Research the costs of building, setting up and operating an abattoir either mobile or stationary. Determine the financial advantage and costs associated with including a custom cutting and cooling facility in conjunction with the abattoir.
- Complete a cost benefit analysis to determine the market demand for locally produced meat needed to justify the cost of building and sustaining an abattoir in the ACRD.
- Prepare food producer cost comparison of processing local livestock at nearest existing facility versus processing at a local facility.
- Investigate grant opportunities that may provide funding to assist with the development of a local abattoir.
- Research demand for a custom cutting and cooling facility that could process local game meat.
- Research demand for cold storage and regulations concerning cold storage that may include both fruit/vegetables and meat.

3.0 MARKET FOR MEAT IN THE STUDY AREA

The consumption of meat in Canada is tracked by Statistics Canada , and reports are provided through the market section of Agriculture and Agri-Food Canada. The most recent per capita consumption data available is for 2014 and is provided below:

	Kilograms	Pounds
Beef	26.48	53.4
Pork	20.63	45.5
Lamb	1.13	2.5
Turkey	4.08	9.0
Chicken	30.94	68.2
Fowl	2.45	5.4

It is noted that beef consumption has been on a decline over the past three decades. In 1980 per capita consumption for beef was 38.8 kg (85.6 pounds) Alternatively, chicken consumption has steadily increased from 16.88 kg (37 pounds) in 1980. Pork consumption also declined over the same period.
However, it does seem that red meat consumption has stabilized over the past 5 years.

Lamb consumption is relatively low at 1.13 kg (2.5 pounds) per person. Some attribute this low number to a lack of availability.

The data is based on carcass weight for beef , pork and lamb. Poultry is based on eviscerated weight.

To get live weight from carcass weight , average weight conversions for market animals were used for the various species. The following table shows the weights by species for a live animal, the slaughter carcass and saleable meat.

RED MEAT		Live Weight	Carcass Weight	RWB (lbs)
Hogs	%	100	72	47% of live weight
Planning weight	lbs	240	173	113
Lambs	%	100	54	41% of live weight
Planning weight	lbs	120	65	49
Beef Steers	%	100	63	41% of live weight
Planning weight	lbs	1,200	750	490
POULTRY		**Live Weight (lbs)**	**Dressing Percentage**	**RWB (lbs)**
Chickens		8	70%	5.6
Turkeys		15	77%	11.6
Ducks		6	58%	3.5

The permanent population of the study area from the 2011 census indicates the size of the consumer market in the Alberni-Clayoquot Regional District.

The market size depicted below does not take into account the significant tourist trmarket associated with visits to Port Alberni and the Pacific Rim area. The Pacific Rim area , including Tofino and Ucluelet is a major tourist destination on Vancouver Island.

As per Parks Canada , visitation to their facilities is some 800,000 people annually. According to BC tourism, 50% of visitors to the coast visit Pacific Rim National Park , which would imply that total visitation is 1.6 million people.

Access to the Pacific Rim is via BC highway 4 which originates near Qualicum Beach and goes to Tofino through the abattoir study area. There are air access options but the vast majority of visitors drive the highway and pass through Port Alberni. This provides some options for meat sales direct to visitors as well as to

food service establishments that cater to the tourist market. The extent of this additional market was impossible to estimate but it could be significant.

City of Port Alberni	17,743
District of Tofino	1,876
District of Ucluelet	1,627
Electoral Area "A" (Bamfield)	275
Electoral Area "B" (Beaufort)	456
Electoral Area "C" (Long Beach)	1,818
Electoral Area "D" (Sproat Lake)	2,295
Electoral Area "E" (Beaver Creek)	3,045
Electoral Area "F" (Cherry Creek)	1,926
TOTAL	**31,061**

To get an estimate of total meat demand in the study area, per capita meat consumption was multiplied by the area population. The figures arrived at are not necessarily accurate as local preferences can result in consumption patterns that are different from the averages.

TABLE A ANNUAL MEAT CONSUMPTION BY PERMANENT RESIDENTS				
Type	**No. of People**	**Per capita(lbs)**	**Total weight in pounds –carcass weight basis**	**No of animals**
Beef	31,061	53.4	1,658,657	(1) 2,211
Pork	31,061	45.5	1,413,275	(2) 8,169
Lamb	31,061	2.5	77,652	(3) 1,194
Chicken	31,061	68.2	2,118,360	(4) 378,278
Fowl	31,061	5.4	167,729	(5) 47,922
Turkey	31,061	9	279,549	(6) 24,099

(1) Total weight divided by average carcass weight of 750 pounds
(2) Total weight divided by carcass weight of 173 pounds
(3) Total weight divided by carcass weight of 65 pounds
(4) Total weight divided by eviscerated weight of 5.6 pounds
(5) Total weight divided by eviscerated weight of 3.5 pounds
(6) Total weight divided by eviscerated weight of 11.6 pounds

4.0 BUSINESS MODEL

Red meat abattoirs are defined on the basis of the final products. A plant that processes meat into products such as canned, smoked and cured meats is significantly different from a plant with facilities for slaughtering without further processing.

This abattoir is intended to be a simple Class A slaughter facility that would also do cut and wrap of the carcasses on a custom basis. It would not purchase livestock and engage in the sale of meat products.

It would operate under the auspices of the Meat Inspection Regulations of the BC Food Safety Act. B.C. Reg. 205/2014, November 24, 2014.

The system is based on a graduated licensing system as per the following table:

LICENCES AVAILABLE UNDER THE GRADUATED LICENSING SYSTEM					
Licence Type	**Activities Permitted**	**Sales Permitted**	**Geographic Scope**	**# of Animal Units**	**Oversight**
Class A	Slaughter, and cut and wrap	Retail and direct to consumer	B.C.	Unlimited	Pre and post slaughter inspection of each animal
Class B	Slaughter only	Retail and direct to consumer	B.C.	Unlimited	Pre and post slaughter inspection of each animal
Class D	Slaughter only (own animals and other peoples' animals)	Retail and direct to consumer	Sales restricted within the regional district where meat is produced	1 - 25	Periodic site assessments and audit of operational slaughter records

Class E	Slaughter only (own animals only)	Direct to consumer only	Sales restricted within the regional district where meat is produced	Unlimited	None
Personal Use No licence required	Slaughter only	None	For producer only	Unlimited	None

Basic Process Description

Slaughtering

- Animals are received and kept in holding pens for 1 day. The animals are watered, but in most cases not fed.
- The animals are then driven from the holding pens to the slaughtering area where the following activities take place:
- Stunning;
- Suspension from an overhead rail by the hind legs;
- Sticking and bleeding over a collecting trough. The collected blood may be sewered or processed;
- Hide removal (cattle) or scalding and dehairing (hogs);

  In some plants hogs are skinned to eliminate scalding and dehairing. Scalding is a method to loosen hair before removal. For several minutes the hogs are held in a scalding tank at 45°C to 65°C. After scalding, the hogs are mechanically dehaired by abrasion and singed in a gas flame to complete the hair removal process.
- Decapitation;
- Opening of the carcass by cutting;
- Inspection of the carcass;
- Evisceration (removal of intestines and internal organs);

- Splitting and cutting of the carcass; and
- Chilling or freezing.

As noted, this abattoir is initially intended to do slaughter as well as cut and wrap. Other value added activities such as curing meats could be considered if as and when the abattoir has been established.

5.0 MARKET FOR CUSTOM SLAUGHTER

The proposed abattoir would provide a basis for local farmers to satisfy a portion of the demand for meat exhibited in section 3.0.
In order to market meat to local consumers , animals must be processed in a licensed and inspected abattoir as per the current regulations.

The market for the proposed abattoir is therefore comprised of animals farmers would bring to the establishment for processing.

In order to document the size of slaughter market, a comprehensive survey was undertaken by an agriculture support worker with the ACRD. A complete copy of the survey results is provided in the appendix.

General Highlights:

- 63 farmers responded to the survey. According to the Alberni Valley Agricultural Plan, there are 89 farms in the study area .
- Close to 100% of the respondents expect to still be farming in 5 years
- 77% expect to be still farming in 10 years.
- 67% of the respondents would expand livestock production if there was a local abattoir.

Beef:

The key results of the survey pertaining to beef cattle are as follows:

- 31 respondents indicated beef sales
- Total number of animals marketed by the respondents was 301
- Live sales numbered 121 and 180 were sold as meat.
- The percentage increase indicated for 2016 was 10%.

It was assumed that the new abattoir would capture 80% of the processing market. The processing market was assumed to be 180 plus 10% or 198 animals. An 80% capture would result in 158 animals being processed.

Sheep:

The key results of the survey pertaining to sheep are as follows:

- Total number of breeding ewes was 106.
- 22 respondents indicated lamb sales.
- 182 lambs were sold in 2015, 200 anticipated in 2016.
- The marketing ratio was 10% live and 90% as meat .

Total meat sales were projected at 180 animals. Based on a 80% capture, 144 lambs would be processed.

Swine:

The key results of the survey pertaining to swine are as follows:

- 14 respondents indicated pork sales.
- Total breeding stock is zero, implying most people are buying weanlings.
- 23 pigs marketed in 2015, 45 anticipated for 2016.

The assumption was made that all pigs were sold as meat. A market capture of 80% would result in 36 animals processed.

Goats:

The key results of the survey pertaining to goats are as follows:

- Total number of breeding stock was 32.

- 14 respondents indicated goat sales.
- 10 goats were sold in 2015, 15 anticipated in 2016.
- The marketing ratio was 100% as meat.

A capture of 80% would result in 12 goats processed.

Fallow Deer:

The key results of the survey pertaining to fallow deer are as follows:

- Total number of breeding stock was 49.
- 2 respondents indicated deer sales.
- 44 deer were sold in 2015, 49 anticipated in 2016.
- It is understood all deer are purchased live by Gunter Brothers.

It is not known if this market could be captured by the proposed abattoir.

Water Buffalo:

The key results of the survey pertaining to water buffalo are as follows:

- 1 respondent indicated water buffalo sales
- 10 animals were sold in 2015, 14 anticipated in 2016
- The marketing ratio was 100% as meat

A capture of 100% would result in 14 animals processed.

6.0 PROCESSING PRICES AND REVENUES

6.1 Pricing

Farmers in the study area utilize abattoirs that are in close proximity in order to minimize travel costs. The two abattoirs that are closest are Gunter Brothers in Courtenay (130 kilometers) and Plecas Meats which is located just south of Nanaimo (104 kilometers).

The price schedules for these plants are noted below:

Plecas Meats

Beef	utm	slaughter	$120	cut and wrap	$0.75/ pound
Beef	otm	slaughter	$150	cut and wrap	$0.75/ pound
Lamb/goats		slaughter	$ 40	cut and wrap	$0.75/pound
Pork		slaughter	$ 50	cut and wrap	$0.70/pound
Pork over 250 lbs		slaughter	$ 60		

Gunter Brothers

Beef	slaughter	$140	cut and wrap	$0.75/pound
Lamb/goats	slaughter	$ 40	cut and wrap	$0.75/pound
Pork	slaughter	$ 60	cut and wrap	$0.75/pound
Sows	slaughter	$100		

Under Thirty Months (utm)

Over Thirty Months (otm)

Prices for these two establishments are similar to those charged by abattoirs in other parts of BC. Note that the meat industry operates mainly in Imperial measure units.

6.2 Projected Revenue

For the purposes of analysis, Gunter Brothers prices were used for the revenue projections.

Other assumptions were as follows:

- The average carcass weight used for beef was 750 pounds
- The average carcass weight used for pork was 173 pounds
- The average carcass weight used for lambs and goats was 65 pounds
- The average carcass weight used for water buffalo was 600 pounds
- It was assumed the abattoir would cut and wrap all the slaughtered animals.

Revenue per beef animal	$140 plus $562.50 equals $702.50
Revenue per pork animal	$60 plus $129.75 equals $189.75
Revenue per lamb animal	$40 plus $48.75 equals $88.75
Revenue per goat animal	$40 plus $48.75 equals $88.75
Revenue per water buffalo	$140 plus $450 equals $590

Total revenue based on 2016 volumes at an 80% capture

Beef	158 at $702.50	$110,995
Hogs	36 at $189.75	$6,831
Water Buffalo	14 at $590	$8,260
Lambs	144 at $88.75	$12,780
Goats	12 at $88.75	$1,065
Total		$139,931

6.3 Hide Revenue

Additional revenue could be obtained from the sale of hides. There is a hide buyer located on Vancouver Island, (Hank Elzinga, 250-398-0757)
The market is for beef hides only. The current price is $20.00 per hide. This would add (158 times $20.00) or $3,160 to total revenues. (It should be noted that prices have been dropping over the past few months) Mr. Elzinga will do on-site pick-up for a minimum lot of 40 hides. To be stored awaiting pick-up, the hides need to be salted and kept indoors.

6.4 Game Processing

The processing of game provides revenue for some abattoirs. However there are some restrictions in terms of how the abattoir must operate when processing game meat.

- Game meat must be processed in the cut and wrap area separately from inspected meat. After completion of game processing the cut and wrap facility and the equipment must be fully sanitized.
- Processed game meat must be stored in a separate cooler. From a logistical standpoint, there should also be a pre-processing storage area so harvested game can be held pending the accumulation of a sufficient quantity of animals.
- At the present time, the BC Agriculture inspection system has no responsibility for the cut and wrap part of the abattoir. The relevant inspection agency is the local health authority. As a general policy, game meat processing in cut and wrap facilities is not a permitted activity unless the local health inspector agrees (on a case by case basis). In the case of the

Alberni health inspector, game processing would be allowed. (As per discussions with Stephanie Bruvall ,EHO)

From a market perspective it is difficult to assess what the market would be for game processing.

- The rates for game meat processing by other abattoirs are as follows:

Game Rainers Meats, Darfield

Hanging	$2/day
Cutting	$0.66/lb
Extra Cleaning	$0.10/lb

Cutting Charges for Game , Gwinners, Cranbrook

Minimum Cutting Charge	$50.00
Elk Skinning	$75.00
Deer Skinning	$45.00
Shrink Wrap Available	$0.50/ bag
Hanging Only	
Elk	$30 1st day, $20 each additional day
Deer	$15 first day, $10 each additional

In the Alberni region, the most common hunted species is the black tail deer. Based on MOE big game harvest statistics for WMU area one for 2013, the following could represent the potential for game processing:

- Zone 3 deer 168, assume 10% 17
- Zone 6 deer 1070, assume 10% 107
- Zone 7 deer 212, assume 50% 106 (Alberni is middle of Zone 7)
  Total 230

The elk harvest in the above zones in 2013 amounted to 8 animals.

A hunter survey would be needed to identify the potential for game processing. The above figures represent a very preliminary estimate of animals that could be available from the 3 zones. Revenue per animal would likely be $75 to $100.

The challenge with doing wild game processing is that the abattoir busy season for beef is the fall which is the same time as hunting season. However it is suggested that the proposed abattoir consider offering game processing if the budget allows for a dedicated game cooler as well as a separate holding area for carcasses.

7.0 SOLID WASTE CONSIDERATIONS

The products resulting from red meat slaughter include carcasses and by-products. The dressing percentage is the carcass weight expressed as a percentage of live weight. Saleable meat results from the carcass being broken down into the various cuts. Dressing percentages and saleable meat percentages vary with a prime finished steer yielding the highest, and canner cows yielding lower.

	Average Dressing %
Prime Steer	64%
Canner Cow	45%

When the animal is further processed, the quantity of saleable meat depends on the quality of the animal. A lean, heavily muscled animal will yield more than a fat animal. For planning purposes, an average beef animal could yield as follows:

- Dressing Percentage of Carcass Weight 61%
- Saleable Meat as a Percentage of Carcass Weight 71%
- Saleable Meat Percentage of Live Weight 43%

(High quality animals could be 52%, lower quality animals as low as 30%.)
The 57% residual includes the hide, which is generally saleable. The hide represents about 8% of weight. This leaves 49% of the animal that is waste including bone, fat, viscera, paunch manure, etc. **For planning purposes, 50% of beef volume by weight is waste.**

For hogs, the yield is typically higher. An average market hog would yield as follows:

- Dressing Percentage 72%
- Saleable Meat as a Percentage of Carcass Weight 65%
- Saleable Meat as a Percentage of Live Weight 47%

(High quality animals could yield as high as 65%, low quality animals could be 37%.) **For planning purposes, the waste to be disposed of from hogs would amount to 50-53% of total live weight.**

Lamb yields are somewhat lower than beef. For planning purposes, an average lamb would yield as follows:

- Dressing Percentage of Carcass Weight 54%
- Saleable Meat as a Percentage of Live Weight 75%
- Saleable Meat Percentage 41%

(Lamb yields range from 31% to 44%.) **For planning purposes, lamb waste to be disposed would be 60%. (This could be reduced somewhat if a market could be found for the hides.)**

Based on the volumes depicted in 0.0, the total annual waste produced by the proposed abattoir would be:

Beef	158 animals at 600 pounds	94,800
Lamb/goats	156 animals at 60 pounds	9,360
Swine	36 animals at 110 pounds	3,960
Water Buffalo	14 animals at 500 pounds	7,000
Total solid waste (pounds)		115,120

This would amount to 58 tons or 52.3 metric tonnes.

The existing abattoirs on Vancouver Island have the option of disposing of solid waste to Island Processing, which is a division of West Coast Reduction. The Island Processing facility is located in Nanaimo. They typically pick up waste at abattoir sites every two weeks which means that offal cold storage is needed. Island Processing provides approved containers (barrels or 1 ton bins) to facilitate pick-up by their trucks. The barrels hold about 300 pounds. The pick-up charge is currently $30 per barrel for non SRM waste and $63 barrel for SRM waste. This amounts to $0.10 and $0.20 per pound respectively. For a beef animal generating 600 pounds of waste, disposal costs would be between $60 and $120 per animal.

The industry used to be able to sell offal to the rendering industry which was a major benefit. However this changed several years ago and now there is a cost to the disposal of slaughter waste.

7.1 SRM Considerations

Specified risk material (SRM) is the general term designated for tissues of ruminant animals (beef) that cannot be inspected and passed for human food because scientists have determined that BSE-causing prions concentrate there. As per the CFIA, SRM are defined as:

- the skull, brain, trigeminal ganglia (nerves attached to the brain), eyes, tonsils, spinal cord and dorsal root ganglia (nerves attached to the spinal cord) of cattle aged 30 months or older; and
- the distal ileum (portion of the small intestine) of cattle of all ages.

For animals over 30 months of age, SRM represents 7% of live weight versus 3% of live weight for cattle under 30 months of age.

A SRM separation strategy enables abattoirs to ship most beef waste at the lower price. The BC Agriculture on-site inspector will certify the separation process.

7.2 Solid Waste Disposal Costs

In discussions with Island Processing, it is understood that they do not service the Alberni area as there is insufficient volume to warrant a truck being sent. The nearest pick up point is Qualicum Beach. The proposed volume noted above would not be sufficient to warrant a change in their current policy.

The only other options are land fill disposal or composting.

There is an existing composting operation in Port Alberni (Earth Land and Sea), which uses seafood waste products as its primary feedstock. According to the owner, they have composted dead livestock at their facility and would be prepared to consider handling abattoir waste. The drop cost (preliminary) would be ($45 MT) $40/ton plus trucking from the abattoir. It is not known if they would take SRM material.

SRM material could be accumulated on site, frozen and then transported under permit to Island Processing. Another option would be for farmers to take the SRM material home and compost on their own property. The cost of waste disposal using the local composting company would be about $0.02/lb for the drop off. For trucking it was assumed at $1.00 per ton/mile (20 km haul, 5 MT per trip) Freight costs would be $100 per trip or $0.05 per pound for a total of $0.07 per pound. To this would need to be added the SRM costs if not disposed of locally. For costing purposes we have used a total of $0.10 per pound.

7.3 Liquid Waste Considerations

The processing of the volume of animals depicted in section 2 would result in the following waste volumes:

Step one: Calculate number of Animal Units. (AU)

Animal Unit (AU) - An animal unit is a method for standardizing from species to species by accounting for various sizes. The term was developed to compare waste creation volumes to one standard (a 1,000 lb steer or a stock cow). The conversion is typically done by weight, i.e. a market lamb is 0.1 AU, as a lamb's weight is 100 lbs.

Beef	158 animals	158 AU
Swine/lamb	36 animals	14 AU
Lambs	156 animals	15 AU
Water Buffalo	14 animals	14 AU
Total		201 AU

Step Two: Assign a value to water use for each animal unit.

A minor quantity of moisture comes from the animals slaughtered, but most effluent results from clean-up procedures. All water used results in wastewater that will require disposal.

Slaughterhouse effluent is considered to have significant potential for environmental pollution, bad odours and health hazards.

Guidelines from B.C.D.C. do not prescribe minimum water use quantities per animal unit. The guidelines are generally based on using enough water to adequately maintain the required standard of cleanliness.

Water utilization estimates vary considerably and are dependent on factors such as:

-the use of dry, pre-clean-up procedures;

-blood collection;

-the use of water conservation nozzles; and

-dry dumping of paunch contents or whole handling of paunch.

Water use estimates per animal unit range from 50 gallons to 440 gallons.

Examples:

- Mallot Creek Engineers – Estimate for a Beef Slaughterhouse (Rainy River, Ontario)
  440 gallons/AU

- CFIA in Ontario
  200 gallons/AU

- San Juan Mobile Unit (Slaughter Only) 50 gallons/AU

- BCFPA MIES help desk experience with small operations, 75 gallons/AU

For this project a volume of 150 gallons per AU has been used which should be more than adequate. There are best practices (see appendix) for reducing water use while at the same time assuring proper sanitation. As one example, the use of steam cleaning can be a way of reducing water volumes.

Step Three: Calculate waste volumes

201 AU times 150 gallons equals 30,150 gallons or 136,881 litres. Based on 120 kill days (40 weeks, 3 days each week), the discharge would be 1140 litres per day. (250 gallons) It is suggested the system be designed for an increase in volume to 300 AU.

The scale of the proposed Alberni abattoir is similar in size to the Salt Spring abattoir. It is not possible to provide a definitive size and design without an

engineering study ,which is beyond the scope of this assignment. However the contractor and the engineer for the Salt Spring project provided the following estimates:

- Engineering costs of $5,500
- Capital costs of $30,000
- Annual maintenance costs of $200

The Eco-Flo system by Premier Tech was used for the Salt Spring abattoir.

http://www.premiertechaqua.com/wastewater-sewer-treatment-plants/biofilter-disinfection-peat

Steven M. Carballeira, P. Geo.
H2O Environmental Ltd.
3060 Lake Road, Denman Island, BC, V0R 1T0
Office: 250-335-1864
Cell: 250-897-8722
www.h2oenvironmental.ca

8.0 ABATTOIR DEVELOPMENT

8.1 Site Considerations

Zoning requirements for the proposed abattoir are covered by the zoning bylaw of the Alberni-Clayoquot Regional District as per the following excerpts:

Abattoir or slaughterhouse means a building or structure specifically designed to accommodate the penning and slaughtering of live animals and the preliminary processing of animal carcasses and may include some packing and treating of the product on the premises.

106 RURAL ABATTOIR (RAB) DISTRICT
This district is intended to provide for custom slaughtering on a small scale on larger properties located in ruralor agricultural areas.

106.1 Uses permitted
(1) One abattoir, provided that the total floor area does not exceed 250 square metres (2,691 square feet).
(2) A maximum of one single family dwelling on a lot where the entire legal parcel is zoned Rural Abattoir (RAB) District.
Where a property is split zoned, and a dwelling unit(s) is/are permitted under the other zoning district(s), a single family dwelling shall not be permitted within the RAB portion of the lot.
(3) Buildings and uses accessory only to a single family dwelling permitted under subsection 106.1(2) above.

106.2 Conditions of Use
(1) An abattoir shall be set back a distance of at least 15 metres (49.2 feet) from any residential use building within the same lot.
(2) Development and use of the property shall be in accordance with all relevant provincial and federal regulations and without restricting the generality of the foregoing with all regulations administered by the Ministries of Agriculture, Health and Environment.
(3) Nothing shall be done which is or will become an annoyance or nuisance to the surrounding areas by reason of unsightliness, the emission of odours, dust, liquid effluent, fumes, smoke, vibration, noise, glare, nor shall anything be done which creates or causes a health, fire or explosion hazard, electrical interference or undue traffic congestion.

It is understood that the ACRD is supportive of this project and would be prepared to entertain a re-zoning application if required. If the land chosen is in the Agricultural Land Reserve, the ACRD would need to work with the ALC to get a rezoning. The following outlines the current policy for abattoirs on ALR land:

> *The ALC position regarding slaughter plants as an "on-farm processing" activity and the composting of red meat waste are as follows:*
> • *If at least 50% of the farm product being stored, packed, prepared or processed is produced on the farm, then the processing of farm products is permitted as a farm use in the Agricultural Land Reserve (ALR).*
> • *Slaughter plants where less than 50% of the farm product being stored, packed, prepared or processed is produced on the farm are considered commercial/industrial plants and must be approved by the ALC through the application process.*
> • *Composting facilities in the ALR established in accordance with the OMRR are prohibited from using SRM as compost feedstock without the express written approval of the ALC.*
> • *Spreading SRM-compost produced off the farm, or SRM-compost produced on the farm where the SRM compost feedstock is imported to the farm, is prohibited without the express written approval of the ALC.* • *The ALC permits the use of non-SRM red meat waste as an acceptable feedstock for composting, and the land application of non-SRM compost on ALR land, provided the composting and use are consistent with the Agricultural Land Reserve Use, Subdivision and Procedure Regulation. The ALC acknowledges that slaughter plants are necessary infrastructure for a healthy cattle industry and that proper handling of red meat waste is crucial. The ALC will continue to work with proponents wishing to develop slaughter plants in the ALR, the cattle industry, local governments, the Ministry of Agriculture and Lands and other provincial ministries to review potential sites for slaughter plants and composting facilities.*

Abattoir development is more appropriate on rural, semi-isolated properties in somewhat close proximity to livestock production areas. Amenities that would be needed include:

-a source of potable water (best option is from a municipal water system)

-electrical power- three phase ideal but not mandatory

-accessible to an all weather road

-soil suitable for septic (sandy, well drained)

-suitable size (2 acres)

8.2 Sizing and Design

The proposed model is sized for 200 AU with provision for a volume increase of 50% to 300 AU within 5 years.

Sizing is based on the abattoir operating doing up to 120 kill days per year (kill days are only possible when inspectors are available so many abattoirs slaughter 2- 3 days a week and do processing on other days) Weekend inspection is generally not provided.

The farm community generally is looking for fall slaughter service and bookings are difficult to get at that time of year. For this model the allocation is assumed as follows:

Quarter one	(January to March)	5%	10 AU
Quarter two	(April to June)	15%	30 AU
Quarter three	(July to September)	35%	70 AU
Quarter four	(October to December)	45%	90 AU

Assume 18 slaughter days in 4th quarter (5 AU per day)

Design considerations for the plant include:

- A covered holding pen is needed for 2 days slaughter. Based on the model, the holding pens would need room for 10 head. The guideline is 60 square feet/AU so 600 s. f. of pen space would be needed, plus 1,000 s.f. for crowding pens and chutes, etc. A separate pen is needed for rejected animals.

- The cooler space guideline for federal plants is nine s.f. per carcass (one AU). (There is no provincial guideline.)

- Typically, a plant would need three coolers; chill or drip, holding and finished products. Freezer space is also needed. The drip cooler should be sized to allow space between the carcasses. Holding coolers can be sized to allow carcasses to be closer together. If game is to be processed a 4th cooler could also be needed. (The game cooler could be a portable reefer unit)

- Cooler/freezer space planning depends on the nature of the business. The aging program will impact on cooler space needs. The maximum hanging time is about 21 days with 14 days being more common for beef.

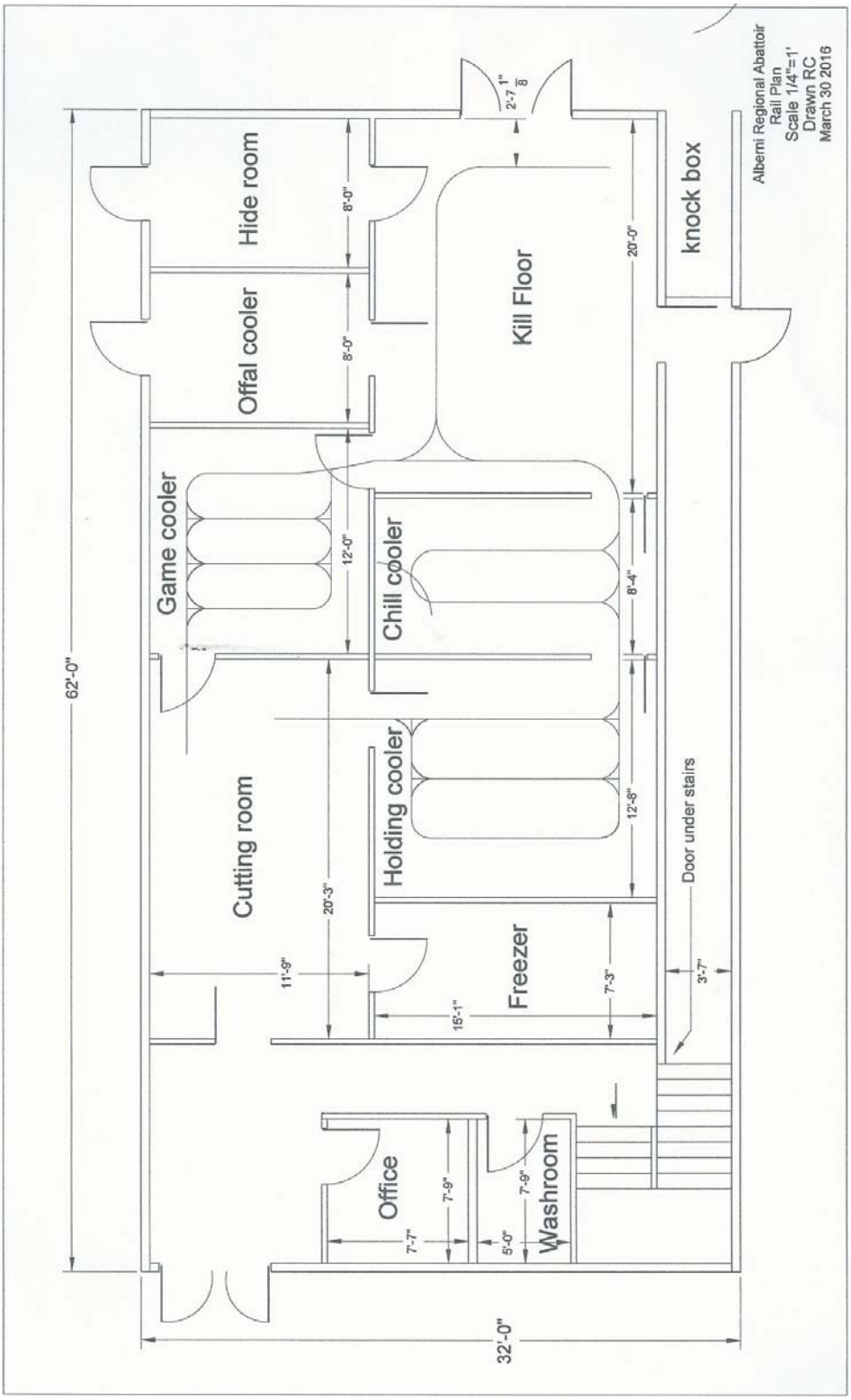
- As per the RFP, there is interest in alternative uses for the cooler(s) such as for vegetables. The storage of vegetables in a meat cooler is not a common practice and the consultant is not aware of any abattoir in BC that that stores vegetables. In fact meat tainting may result from the storing of some fruits and vegetables with meat (apples, potatoes etc)

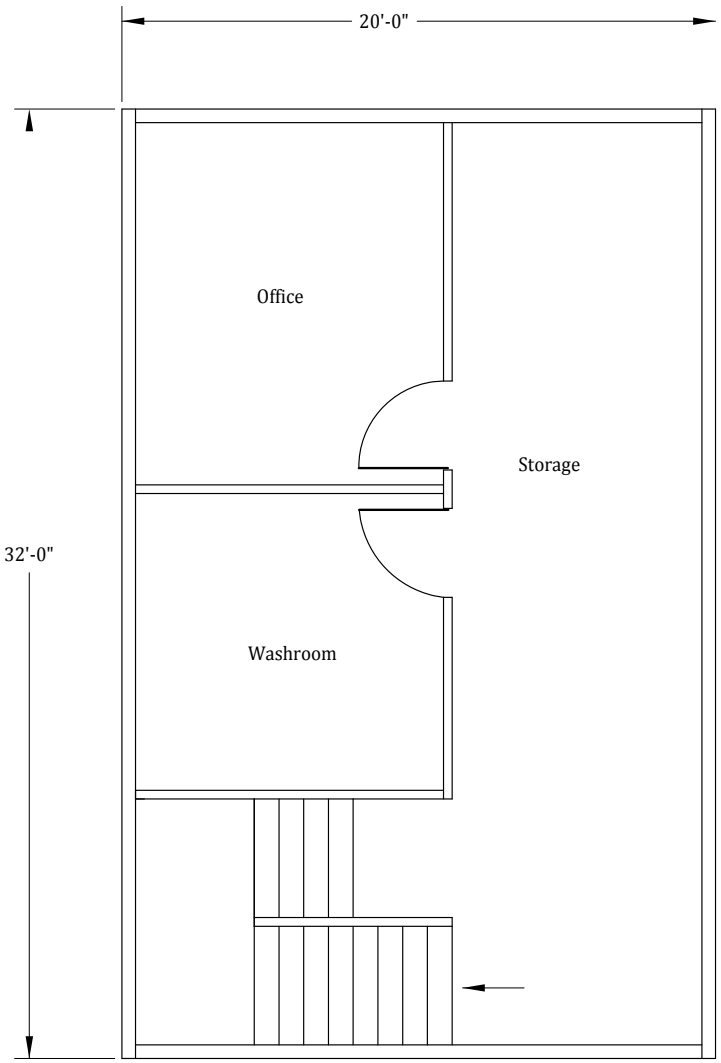
Red Meat Area Program
For Alberni Abattoir, Preliminary
Beef, pork , lamb

Functional Area	S.F. Area
Stun area	50
Kill/Eviseration area	300
Chill/Drip cooler	124
Holding Cooler	191
Processing room	240
Finished products/Game cooler	144
Freezer	105
Hide room	96
Offal storage	96
Total Functional	**1346**
Support Areas	
Mechanical (mezzanine)*	
Storage (mezzanine)*	
W/c Unisex	40
Shipping	120
Inspector's office	64
Plant office (mezzanine) *	
Change room/showers *	
Total Support	**224**
Total Space	**1570**
Add circulation for walls, corridors, etc. at 25%	414
Total Footprint	**1984**

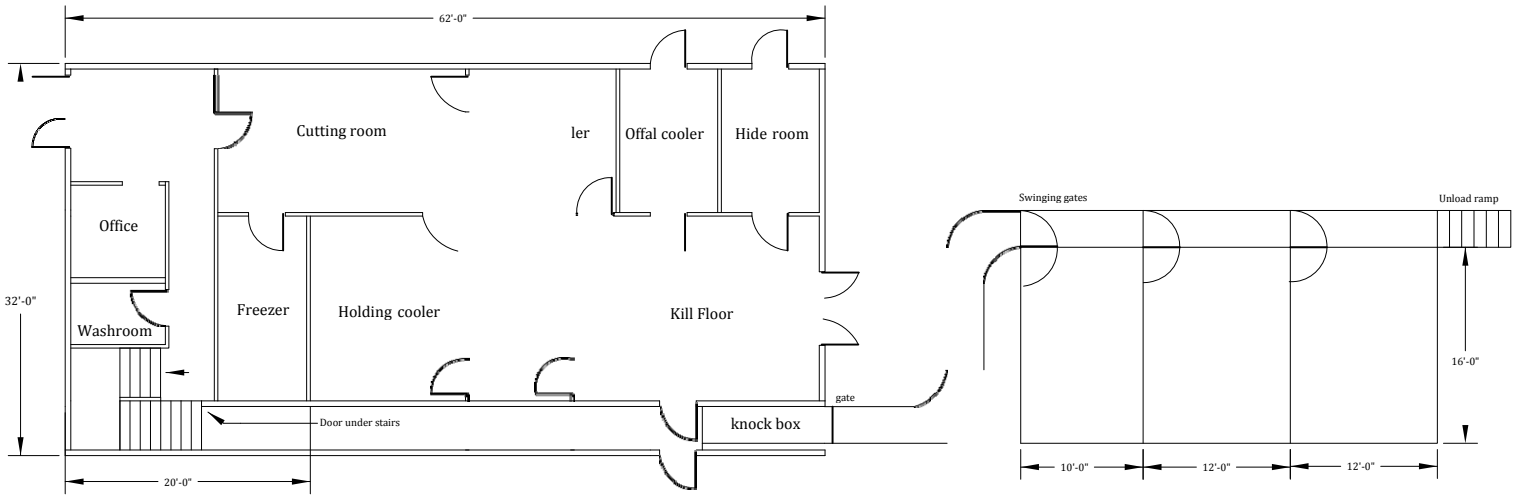
Mezzanine is 20 by 32 which adds 640 square feet of useable space. Mezzanine height available due to ceiling height requirement for rail for beef.

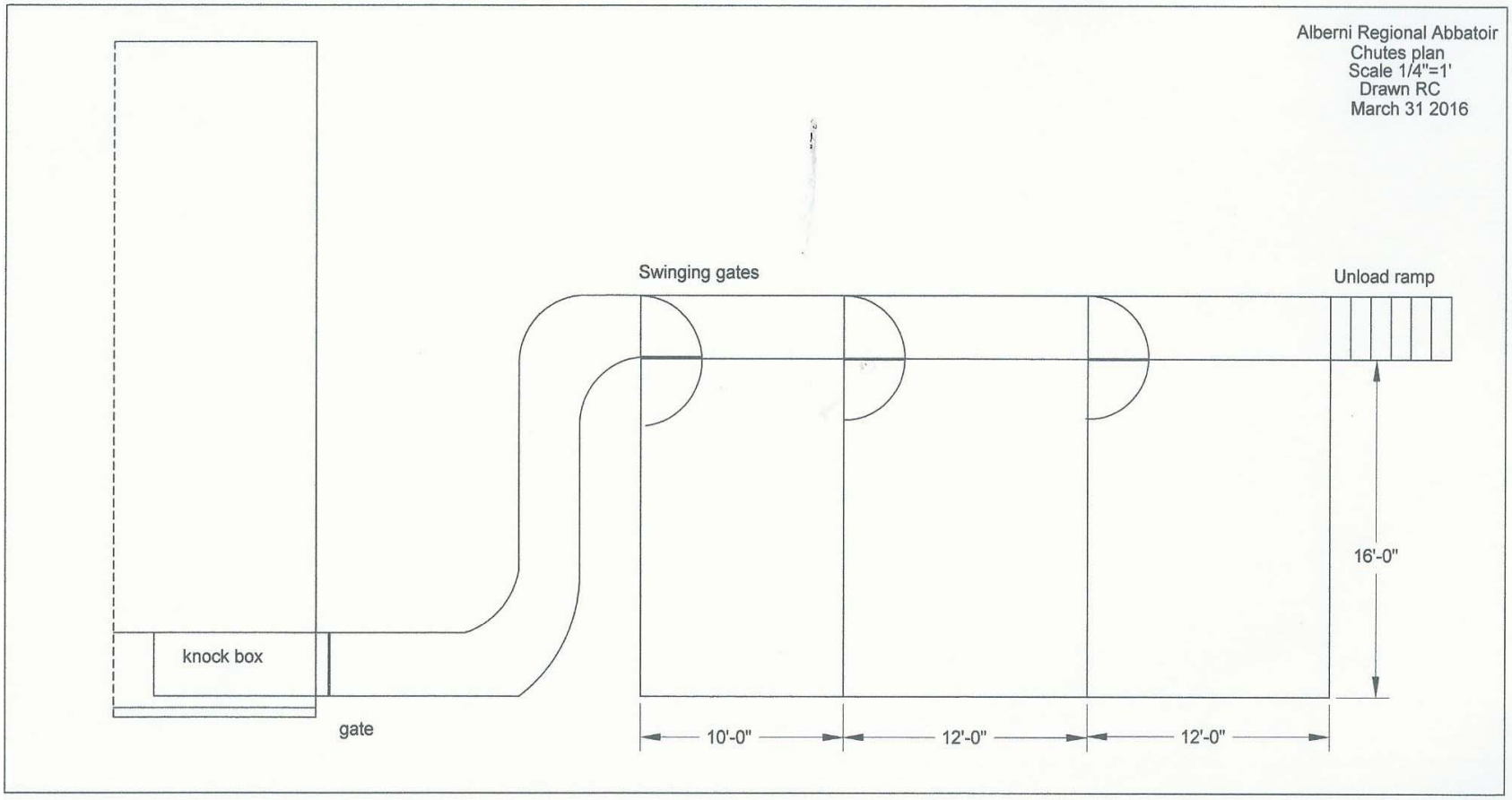
Floor plans are provided as follows:





Alberni Regional Abattoir
Mezzanine
Floor Plan
Scale 1/4"=1'
Drawn RC
March 31 2016


62'-0"
Cutting room
ler
Offal cooler
Hide room
Office
32'-0"
Freezer
Holding cooler
Kill Floor
Washroom
gate
Door under stairs
knock box
20'-0"
Swinging gates
Unload ramp
16'-0"
10'-0"
12'-0"
12'-0"


Alberni Regional Abbatoir
Chutes plan
Scale 1/4"=1'
Drawn RC
March 31 2016
Swinging gates
Unload ramp
16'-0"
knock box
gate
10'-0"
12'-0"
12'-0"

8.3 Specifications and Construction Approach

There are a number of construction methodology options that could be used for the proposed abattoir but the recommended one is to use a pre-engineered steel building. The advantages of such an approach include the following:

- Speed of construction
- Durability
- Fire safety
- Capacity of beams to support hanging animals.
- Low maintenance and upkeep
- Clear span gives lots of design flexibility
- Cost effective

We have obtained a quote for a 32 by 16 building from VISB of Qualicum Beach, BC based on the following specifications:

Specifications for the Building:
Width: 32'
Length: 62'
Eave height: 16'
Roof slope: 1 /12
Roof type: Symmetrical Gable
Bay spacing: 2 @ 21', 1 @20'
Frames: 2 clear span rigid frames.
End walls: 2 post and beam end walls, non-expandable.
Roof cladding: 24 ga. SSR roof system. Galvalume.
Wall cladding: 26 ga. Wall cladding. Manufactures standard colors.
Liner Panel: none included.
Canopies: None included.
Roof Insulation: 6" WMP 50 MBI
Wall Insulation: 6" WMP 50 MBI
Gutters & downspouts: 124' of gutter, c/w downspouts, manufactures standard colours.
Doors: 2 @ 3X7, 2 @ 6X7.
Windows: none included.
Framed Openings: none included
Overhead Doors: none included.
Mezzanine: None.
Overhead Crane: None.

Misc: Primary is shop primed. SP2 prep. Girts and purlins are galvanized. Base channel included.

Design Criteria:

BC Building Code 2012
Collateral Load = 2
Snow Load = 62.656
Rain Load = 6.683
Wind Load 1:50 = 8.145
Seismic Data
Sa (0.2) = 0.76
Sa ().5) = 0.57
Sa (1.0) = 0.30
Sa (2.0) = 0.16

It is suggested that a general contractor be hired to manage the project and sub-contract the various other components as required. This would include:

- Site preparation
- Drainage and plumbing prior to concrete
- Concrete work including foundation, curbs and floor. The final surface would be sealed concrete with coving to the 24" curbs
- Interior partitions (steel studs)
- Plumbing and wiring rough-ins
- Interior insulation for refrigeration
- Wall cladding
- Mezzanine floor including stairs
- Washroom main floor
- Mezzanine floor shower/change room
- Offices
- Corrals and pole barn covering

8.4 Capital Cost

A Class C estimate is provided as well as an equipment schedule.

Alberni Abattoir
Preliminary Cost Estimate 2016
Area in sf 1984

Item number	Description	Notes	Class C
1	Site preparation and access	Assumes site is cleared	$10,000
2	Fill and compaction		$10,000
3	Hook ups	water, electricity	$8,000
4	Concrete	foundation, 24" curbs, 5 inch reinforced slab sloped to drains, coved to curbs, all concrete to be sealed	$10,000
5	plumbing including water and drainage		$25,000
6	electrical	lights, equipment outlets, refrigeration , wiring	$25,000
7	Partitions	walls clad FRP, insulation, doors at $30/sf	$59,520
8	Rails	200 lineal feet at $50	$10,000
9	Knock box	Concrete and pipe with steel doors	$3,000
10	Pole barn covered corrals with asphalt surface and pipe gates	two holding corrals plus reject pen	$25,000
11	landscaping	gravel lot, access approach	$10,000
12	Septic	Engineering and construction (Ecoflo)	$35,000
13	Steel building	As per quote from VISB plus GST	$68,499
Subtotal			$299,019
14	Equipment as per list		$37,500
Total			$336,519
Soft Costs and other			
1	Design	floor plan,	$12,000
2	project management	10% of construction	$33,652
3	legal fees		10000
4	Land		100,000
Subtotal			$155,652
Total			$492,171
Contingency at 10%			$49,217
Total			$541,388

Equipment List

stunner	captive bolt	$ 2500
winches		$ 1000
rail scale	digital readout	$ 3000
splitting saw	Kentmaster 60 Inch new	$ 6000
Hooks, 18 long, 24 short		$ 3000
band saw	Biro 44 used	$ 5000
cradles	beef, and lamb	$ 2000
hog tumbler (used)		$ 6000
grinder	ButcherBoy mixer grinder used	$ 2500
work table	stainless with plastic top	$ 2000
wrapping table	stainless	$ 2000
misc knives and small tools		$ 2500
		$ 37500

Note that land costs are estimated at $100,000 for 2 acres. This is based on realtor information provided from listings.

9.0 FINANCIAL PROJECTIONS

Over the the past several years, the consultant has had experience with 3 abattoir startups.

Case Study one

This project was a new build and was a slaughter only project. The proponent name is not identified due to privacy concerns but the individual was a successful farmer who was willing and able to pledge his farm assets for the project. He also was able to access the MTAP grant funding for a substantial part of the cost. (The MTAP maximum was $150K.) The project cost was over $500,000 including $100,000 for a solid waste composting facility.

Case Study Two

The Salt Spring abattoir was funded without commercial debt. However, it was able to access the MTAP grant in full for the project. The overall cost based on a mobile configuration was around $350,000. The site is on leased land.

Community support was significant and is ongoing. An anonymous donor gave $75,000 conditional on matching community donations and the matching amount was easily exceeded. Some debt was required and this was provided by private supporters. The Agricultural Alliance owns the abattoir which is located on leased land. A non-profit corporation operates the abattoir.

Case Study Three

The Farmers Alliance in Invermere (Columbia Valley) started work on developing an abattoir near the end of the MTAP program. They had land and

were able to access an MTAP grant. However, due to delays in a rezoning submission, plus a lack of other funding, the project did not meet the MTAP funding deadline. As a result the grant was cancelled.

The Columbia Basin Trust has provided a small grant ($25K) . The estimated project cost is over $500,000. According to one of the original proponents, the project is proceeding but is no longer an alliance project. It has been taken over by an area rancher who is funding it as a private business.

Options for the Alberni abattoir

Developing a new abattoir is going to be challenging , given that the MTAP grant program that funded plant upgrades and start-ups is no longer available. (MTAP was administered by the British Columbia Food Processors Association) Capital funding is not available through the Investment Agriculture Foundation .

It is possible that the Economic Infrastructure Program of the Island Coastal Economic Trust could provide funding but significant applicant equity would be needed. (ICET is looking for a 1:3 financing model) In addition, the abattoir would need to be set up as a non-profit community venture.

Bank lending to the small abattoir sector has been a challenge and it would be difficult for a non-profit to access conventional financing due to security issues. There may be possibilities through the Community Futures program. One option to reduce the capital cost would be to lease the land as per the Salt Spring model.

For the purposes of analysis , the financing assumption are as follows:

- 25% equity and a 40% grant, with the remainder financed (perhaps with a Community Futures Loan)
- 2 acres land parcel leased at $5,000 per year

The financial scenario also assumes a 100% capture of cut and wrap (every animal that is slaughtered by the abattoir) The live animal capture rate is 80%.

The abattoir projections indicate that the abattoir could be generating a reasonable profit within 2-3 years. However, as noted above, this is based on an aggressive level of capture of the cut and wrap business. A reduction to a 75% cut and wrap capture would result in losses until year 4.

Another key issue is the financing scenario. A highly leveraged financial structure would put the project at risk. In addition, the availability of a large amount of debt financing is doubtful.

To make this project happen the local community would need to contribute enough equity to attract grant and loan money from other sources.

Another key issue is finding competent management to operate the facility. The financial projections assume the manager would be paid both for working as slaughter person and meat cutter as well as receiving a management wage. In year one total wage costs are about $60,000. Note that the abattoir would only operate about 120 days per year in year one.

One option might be for a local organization to finance and develop the plant and then lease it to a qualified operator.

Alberni Abattoir (alternative financing)
(100% capture cut and wrap)
Income and Expense Projections

	Year 1	Year 2	Year 3	Year 4	Year 5
Revenue					
Slaughter Sales	$32,480	$36,286	$40,554	$45,341	$50,710
Cut and Wrap fees	$107,451	$120,032	$134,137	$149,953	$167,688
Hide sales	$3,160	$3,546	$3,978	$4,901	$5,008
Total sales	$143,091	$159,863	$178,669	$200,195	$223,406
Less: Direct Costs	$69,815	$76,299	$83,481	$91,439	$100,256
Total Gross Profit	$73,277	$83,565	$95,188	$108,756	$123,150
Expenses					
Insurance	$3,600	$3,708	$3,819	$3,934	$4,052
Bank Charges	$600	$618	$637	$656	$675
Communications	$3,600	$3,708	$3,819	$3,934	$4,052
Advertising/Donations	$325	$335	$345	$355	$366
Uniforms	$2,400	$2,472	$2,546	$2,623	$2,701
Professional Fees	$3,000	$3,090	$3,183	$3,278	$3,377
Sub-Total	$13,525	$13,931	$14,348	$14,779	$15,222
rent and utilities	$12,000	$12,360	$12,731	$13,113	$13,506
Repairs/Maintenance	$3,600	$3,708	$3,819	$3,934	$4,052
Facility Manager	$24,000	$24,720	$25,462	$26,225	$27,012
Total Expenses	$53,125	$54,719	$56,360	$58,051	$59,792
Net Income BDIT	$20,152	$28,846	$38,828	$50,705	$63,357
Less: Interest costs	$4,173	$3,851	$3,513	$3,157	$2,782
Net Income BDT	$15,979	$24,995	$35,315	$47,548	$60,575
Less: Depreciation	$23,416	$21,159	$19,257	$17,641	$16,260
Net Income BT	$7,437	$3,836	$16,058	$29,907	$44,315

Alberni Abattoir (alternative financing)(100% capture of cut and wrap)
Cash Flow Projection

	Start-Up	Year 1	Year 2	Year 3	Year 4	Year 5
Sources of Funds						
Owners at 25%	$135,347	$ -	$ -	$ -	$ -	$ -
	$135,347	-	-	-	-	-
Grants at 40%	$216,555	-	-	-	-	-
Total equity	$351,902	-	-	-	-	-
Total Debt Financing	$ 79,486	$ -	$ -	$ -	$ -	$ -
Net Income	$ -	$ 7,437	$ 3,836	$ 16,058	$ 29,907	$ 44,315
Add: Depreciation		$ 23,416	$ 21,159	$ 19,257	$ 17,641	$ 16,260
Total Sources of Funds	$431,388	$ 15,979	$ 24,995	$ 35,315	$ 47,548	$ 60,575
Uses of Funds						
Building	$379,138	$ -	$ -	$ -	$ -	$ -
Equipment Purchases	$ 41,250	-	-	-	-	-
Legal	$ 11,000	-	-	-	-	-
Total Uses	$431,388	$ -	$ -	$ -	$ -	$ -
Loan payment		$ 6,125	$ 6,447	$ 6,785	$ 7,141	$ 7,516
Net Cash Flow	$ -	$ 9,854	$ 18,548	$ 28,530	$ 40,407	$ 53,059
Beginning Cash Balance	$ 2	$ 2	$ 9,856	$ 28,404	$ 56,934	$ 97,341
Ending Cash Balance	$ 2	$ 9,856	$ 28,404	$ 56,934	$ 97,341	$150,400

Alberni Abattoir (alternative financing with 100% cut and wrap)
Cost of Sales Projection

	Year 1	Year 2	Year 3	Year 4	Year 5
Sales					
Custom Slaughter	$32,480	$36,286	$40,554	$45,341	$50,710
Cut and Wrap	$80,684	$90,131	$100,723	$112,599	$125,918
Hides	$3,160	$3,546	$3,978	$4,901	$5,008
Total Revenue	$116,324	$129,962	$145,255	$162,841	$181,636
Direct Labour Costs					
Hours/Animal Unit (AU)	7.0	7.0	7.0	7.0	7.0
No. of AUs	218	237	257	280	305
Total Hours Worked	1,526	1,658	1,802	1,962	2,137
Wage Rate	$20.00	$20.00	$20.00	$20.00	$20.00
Benefits	20%	20%	20%	20%	20%
Total Wage Costs/Hour	$24.00	$24.00	$24.00	$24.00	$24.00
Total Direct Labour Costs	$36,624	$39,782	$43,257	$47,078	$51,282
Water and Waste Disposal Costs					
Water Costs/AU	$0.25	$0.26	$0.27	$0.27	$0.28
Liquid Disposal Costs/AU	5.00	$5.15	$5.30	$5.46	$5.63
Solid Disposal Costs/AU	60.00	$61.80	$63.65	$65.56	$67.53
Total Waste Disposal Costs/AU	$65.25	$67.21	$69.22	$71.30	$73.44
Total Waste Disposal Costs	$14,225	$15,915	$17,824	$19,980	$22,417
Materials & Miscellaneous Costs					
Material and Misc. Cost/AU	$15.00	$15.00	$15.00	$15.00	$15.00
Total Material & Misc. Costs	$3,270	$3,552	$3,862	$4,203	$4,579
Total Direct Costs	**$54,119**	**$59,249**	**$64,943**	**$71,262**	**$78,278**
Gross Profit	**$62,205**	**$70,713**	**$80,312**	**$91,579**	**$103,357**

Alberni Abattoir (alternative financing)
Balance Sheet Projection

	Start-Up	Year 1	Year 2	Year 3	Year 4	Year 5
Assets						
Current Assets						
Cash	$2	$9,856	$28,404	$56,934	$97,341	$150,400
Total Current Assets	$2	$9,856	$28,404	$56,934	$97,341	$150,400
Long Term Assets						
Building	$379,138	$363,972	$349,414	$335,437	$322,020	$309,139
Equipment	41,250	33,000	26,400	21,120	16,896	13,517
Incorporation	11,000	11,000	11,000	11,000	11,000	11,000
Total Long Term Assets	$431,388	$407,972	$386,814	$367,557	$349,916	$333,656
TOTAL ASSETS	$431,390	$417,828	$415,217	$424,491	$447,256	$484,056
Liabilities						
Term Loan	$79,486	$73,361	$66,914	$60,129	$52,988	$45,472
grants	$216,555	$216,555	$216,555	$216,555	$216,555	$216,555
Total Liabilities	$296,041	$289,916	$283,469	$276,684	$269,543	$262,027
Equity						
Start Balance	$2	$135,349	$127,912	$131,748	$147,806	$177,713
Additions	135,347	-7,437	3,836	16,058	29,907	44,315
Ending Balance	$135,349	$127,912	$131,748	$147,806	$177,713	$222,028
TOTAL EQUITY AND LIABILITIES	$431,390	$417,828	$415,217	$424,491	$447,256	$484,056

Alberni Abattoir (alternative financing)
Depreciation Schedules

Equipment (20% Declincing Balance)

Year	Opening Balance	Depreciation	Acc. Depreciation.	End Balance
1	$41,250	$8,250	$8,250	$33,000
2	33,000	6,600	14,850	26,400
3	26,400	5,280	20,130	21,120
4	21,120	4,224	24,354	16,896
5	16,896	3,379	27,733	13,517

Buildings (4% Declining Balance)

Year	Opening Balance	Depreciation	Acc. Depreciation.	End Balance
1	$379,138	$15,166	$15,166	$363,972
2	363,972	14,559	29,724	349,414
3	349,414	13,977	43,701	335,437
4	335,437	13,417	57,118	322,020
5	322,020	12,881	69,999	309,139

Long Term Loan

Year	Opening Balance	Principal	Interest	Total	Ending Balance
1	$79,486	6,125	$4,173	$10,298	$73,361
2	73,361	6,447	$3,851	10,298	$66,914
3	66,914	6,785	$3,513	10,298	$60,129
4	60,129	7,141	$3,157	10,298	$52,988
5	52,988	7,516	$2,782	10,298	$45,472

Alberni Abattoir
Custom Slaughter of Lamb,Hogs, Cattle and Water Buffalo

Cattle

	Year 1			Year 2			Year 3		
Month	Cattle	Killing Fee	Total Fees	Cattle	Killing Fee	Total Fees	Cattle	Killing Fee	Total Fees
January	-	$140	$-	-	$143	$-	-	$146	$-
February	-	$140	-	-	$143	-	-	$146	-
March	7	$140	980	8	$143	1,100	8	$146	1,234
April	7	$140	980	8	$143	1,100	8	$146	1,234
May	8	$140	1,120	9	$143	1,257	10	$146	1,410
June	8	$140	1,120	9	$143	1,257	10	$146	1,410
July	16	$140	2,240	18	$143	2,513	19	$146	2,820
August	32	$140	4,480	35	$143	5,027	39	$146	5,640
September	32	$140	4,480	35	$143	5,027	39	$146	5,640
October	32	$140	4,480	35	$143	5,027	39	$146	5,640
November	16	$140	2,240	18	$143	2,513	19	$146	2,820
December		$140	-		$143	-		$146	-
Total	158		$22,120	174		$24,819	191		$27,847

	Year 4			Year 5		
Month	Cattle	Killing Fee	Total Fees	Cattle	Killing Fee	Total Fees
January	-	$149	$-	-	$152	$-
February	-	$149	-	-	$152	-
March	9	$149	1,384	10	$152	1,553
April	9	$149	1,384	10	$152	1,553
May	11	$149	1,582	12	$152	1,775
June	11	$149	1,582	12	$152	1,775
July	21	$149	3,164	23	$152	3,550
August	43	$149	6,328	47	$152	7,100
September	43	$149	6,328	47	$152	7,100
October	43	$149	6,328	47	$152	7,100
November	21	$149	3,164	23	$152	3,550
December		$149	-		$152	-
Total	210		$31,244	231		$35,056

Lambs/goats

	Year 1			Year 2			Year 3		
Month	Lambs	Killing Fee	Total Fees	Lambs	Killing Fee	Total Fees	Lambs	Killing Fee	Total Fees
January	-	$40	$-	-	$41	$-	-	$42	$-
February	-	40	-	-	41	-	-	42	-
March	-	40	-	-	41	-	-	42	-
April	78	40	3,120	86	41	3,501	94	42	3,928
May		40	-	-	41	-		42	-
June	-	40	-	-	41	-	-	42	-
July	-	40	-	-	41	-	-	42	-
August	-	40	-	-	41	-	-	42	-
September	39	40	1,560	43	41	1,750	47	42	1,964
October	39	40	1,560	43	41	1,750	47	42	1,964
November	-	40	-		41	-	-	42	-
December	-	40	-	-	41	-	-	42	-
Total	156		$6,240	172		$7,001	189		$7,855

	Year 4			Year 5		
Month	Lambs	Killing Fee	Total Fees	Lambs	Killing Fee	Total Fees
January	-	$42	$ -	-	$43	$-
February	-	42	-	-	43	-
March	-	42	-	-	43	-
April	104	42	$ 4,407	114	43	4,945
May		42	-		43	-
June	-	42	-	-	43	-
July	-	42	-	-	43	-
August	-	42	-	-	43	-
September	52	42	$ 2,203	57	43	2,472
October	52	42	$ 2,203	57	43	2,472
November	-	42	-	-	43	-
December	-	42	-	-	43	-
Total	208		$ 8,814	228		$9,889

Water Buffalo

	Year 1			Year 2			Year 3		
Month	Water Buffalo	Killing Fee	Total Fees	Water Buffalo	Killing Fee	Total Fees	Water Buffalo	Killing Fee	Total Fees
January	-	$140	$-	-	$144	$-	-	$149	$-
February	-	140	-	-	144	-	-	149	-
March	-	140	-	-	144	-	-	149	-
April	-	140	-	-	144	-	-	149	-
May	-	140	-	-	144	-	-	149	-
June	-	140	-	-	144	-	-	149	-
July	-	140	-	-	144	-	-	149	-
August	14	140	1,960	14	144	2,019	14	149	2,079
September	-	140	-	-	144	-	-	149	-
October	-	140	-	-	144	-	-	149	-
November	-	140	-	-	144	-	-	149	-
December	-	140	-	-	144	-	-	149	-
Total	14		$1,960	14		$2,019	14		$2,079

	Year 4			Year 5		
Month	Water Buffalo	Killing Fee	Total Fees	Water Buffalo	Killing Fee	Total Fees
	$-	$153	$-	$-	$158	$-
January	$-	153	-	-	158	-
February	$-	153	-	-	158	-
March	$-	153	-	-	158	-
April	$-	153	-	-	158	-
May	$-	153	-	-	158	-
June	$-	153	-	-	158	-
July	14	153	2,142	14	158	2,206
August	-	153	-	-	158	-
September	-	153	-	-	158	-
October	-	153	-	-	158	-
November	-	153	-	-	158	-
December	14		$2,142	14		$2,206

Pork: Hogs

	Year 1			Year 2			Year 3		
Month	Hogs	Killing Fee	Total Fees	Hogs	Killing Fee	Total Fees	Hogs	Killing Fee	Total Fees
January	-	$60	$-	-	$62	$-	-	$64	$-
February	-	60	-	-	62	-	-	64	-
March	-	60	-	-	62	-	-	64	-
April	-	60	-	-	62	-	-	64	-
May	-	60	-	-	62	-	-	64	-
June	-	60	-	-	62	-	-	64	-
July	-	60	-	-	62	-	-	64	-
August	-	60	-	-	62	-	-	64	-
September	36	60	$2,160	40	62	2,447	44	64	2,773
October	-	60	-	-	62	-	-	64	-
November	-	60	-	-	62	-	-	64	-
December	-	60	-	-	62	-	-	64	-
Total	36		$2,160	40		$2,447	44		$2,773

	Year 4			Year 5		
Month	Hogs	Killing Fee	Total Fees	Hogs	Killing Fee	Total Fees
January	-	$66	$-	-	$68	$ -
February	-	66	-	-	68	-
March		66	-	-	68	-
April	-	66	-	-	68	-
May	-	66	-	-	68	-
June	-	66	-	-	68	-
July	-	66	-	-	68	-
August		66	-		68	-
September	48	66	$3,142	53	68	$ 3,559
October	-	66	-	-	68	-
November	-	66	-	-	68	-
December	-	66	-	-	68	-
Total	48		$3,142	53		$ 3,559

Total Custom Kill Revenue by the Month

Month	Year 1	Year 2	Year 3	Year 4	Year 5
January	$ -	$ -	$ -	$ -	$ -
February	$ -	$ -	$ -	$ -	$ -
March	$ 980	$1,100	$1,234	$1,384	$1,553
April	$4,100	$4,600	$5,161	$5,791	$6,498
May	$1,120	$1,257	$1,410	$1,582	$1,775
June	$1,120	$1,257	$1,410	$1,582	$1,775
July	$2,240	$2,513	$2,820	$3,164	$3,550
August	$6,440	$7,045	$7,719	$8,470	$9,306
September	$8,200	$9,224	$10,376	$11,673	$13,131
October	$6,040	$6,777	$7,604	$8,531	$9,572
November	$2,240	$2,513	$2,820	$3,164	$3,550
December	$ -	$ -	$ -	$ -	$ -
Total	$32,480	$36,286	$40,554	$45,341	$50,710

Hide Fees

Month	Year 1	Year 2	Year 3	Year 4	Year 5
January	$ -	$ -	$ -	$ -	$ -
February	$ -	$ -	$ -	$ -	$ -
March	$140	$157	$176	$217	$222
April	$140	$157	$176	$217	$222
May	$160	$180	$201	$248	$254
June	$160	$180	$201	$248	$254
July	$320	$359	$403	$496	$507
August	$640	$718	$806	$993	$1,014
September	$640	$718	$806	$993	$1,014
October	$640	$718	$806	$993	$1,014
November	$320	$359	$403	$496	$507
December	$ -	$ -	$ -	$ -	$ -
Total	$3,160	$3,546	$3,978	$4,901	$5,008

Alberni Abattoir Cut and Wrap Fees

based on 100% of kill

Cattle

	Year 1			Year 2			Year 3		
Month	Cattle	CW fee	Total Fees	Cattle	CW fee	Total Fees	Cattle	CW fee	Total Fees
January	-	$563	$-	-	$574	$-	-	$585	$-
February	-	$563	-	-	$574	-	-	$585	-
March	7	$563	3,938	8	$574	4,418	8	$585	4,957
April	7	$563	3,938	8	$574	4,418	8	$585	4,957
May	8	$563	4,500	9	$574	5,049	10	$585	5,665
June	8	$563	4,500	9	$574	5,049	10	$585	5,665
July	16	$563	9,000	18	$574	10,098	19	$585	11,330
August	32	$563	18,000	35	$574	20,196	39	$585	22,660
September	32	$563	18,000	35	$574	20,196	39	$585	22,660
October	32	$563	18,000	35	$574	20,196	39	$585	22,660
November	16	$563	9,000	18	$574	10,098	19	$585	11,330
December		$563	-		$574	-		$585	-
Total	158		$88,875	174		$99,718	191		$111,883

	Year 4			Year 5		
Month	Cattle	CW fee	Total Fees	Cattle	CW fee	Total Fees
January	-	$597	$ -	-	$609	$ -
February	-	$597	-	-	$609	-
March	9	$597	$ 5,562	10	$609	$ 6,240
April	9	$597	5,562	10	$609	6,240
May	11	$597	6,356	12	$609	7,132
June	11	$597	6,356	12	$609	7,132
July	21	$597	12,712	23	$609	14,263
August	43	$597	25,424	47	$609	28,526
September	43	$597	25,424	47	$609	28,526
October	43	$597	25,424	47	$609	28,526
November	21	$597	12,712	23	$609	14,263
December		$597	-		$609	-
Total	210		$125,533	231		$140,848

Lambs/goats

	Year 1			Year 2			Year 3		
Month	Lambs	CW fee	Total Fees	Lambs	CW fee	Total Fees	Lambs	CW fee	Total Fees
January	-	$49	$ -	-	$50	$ -	-	$51	$-
February	-	49	-	-	50	-	-	51	-
March	-	49	-	-	50	-	-	51	-
April	78	49	$3,803	86	50	$4,266	94	51	$4,787
May		49	-	-	50	-		51	-
June	-	49	-	-	50	-	-	51	-
July	-	49	-	-	50	-	-	51	-
August	-	49	-	-	50	-	-	51	-
September	39	49	1,901	43	50	2,133	47	51	2,393
October	39	49	1,901	43	50	2,133	47	51	2,393
November	-	49	-		50	-	-	51	-
December	-	49	-	-	50	-	-	51	-
Total	156		$7,605	172		$8,533	189		$9,574

	Year 4			Year 5		
Month	Lambs	CW fee	Total Fees	Lambs	CW fee	Total Fees
January	-	$52	$-	-	$53	$-
February	-	52	-	-	53	-
March	-	52	-	-	53	-
April	104	52	5,371	114	53	6,026
May		52	-		53	-
June	-	52	-	-	53	-
July	-	52	-	-	53	-
August	-	52	-	-	53	-
September	52	52	2,685	57	53	3,013
October	52	52	2,685	57	53	3,013
November	-	52	-	-	53	-
December	-	52	-	-	53	-
Total	208		$10,742	228		$12,052

Water Buffalo

	Year 1			Year 2			Year 3		
Month	Water Buffalo	CW fee	Total Fees	Water Buffalo	CW fee	Total Fees	Water Buffalo	CW fee	Total Fees
January	-	$450	$-	-	$464	$-	-	$477	$-
February	-	450	-	-	464	-	-	477	-
March	-	450	-	-	464	-	-	477	-
April	-	450	-	-	464	-	-	477	-
May	-	450	-	-	464	-	-	477	-
June	-	450	-	-	464	-	-	477	-
July	-	450	-	-	464	-	-	477	-
August	14	450	6,300	14	464	6,489	14	477	6,684
September	-	450	-	-	464	-	-	477	-
October	-	450	-	-	464	-	-	477	-
November	-	450	-	-	464	-	-	477	-
December	-	450	-	-	464	-	-	477	-
Total	14		$6,300	14		$6,489	14		$6,684

	Year 4			Year 5		
Month	Water Buffalo	CW fee	Total Fees	Water Buffalo	CW fee	Total Fees
January	$-	$492	$-	$-	$506	$-
February	$-	492	-	-	506	-
March	$-	492	-	-	506	-
April	$-	492	-	-	506	-
May	$-	492	-	-	506	-
June	$-	492	-	-	506	-
July	$-	492	-	-	506	-
August	14	492	6,884	14	506	7,091
September	-	492	-	-	506	-
October	-	492	-	-	506	-
November	-	492	-	-	506	-
December	-	492	-	-	506	-
Total	14		$6,884	14		$7,091

Pork: Hogs

	Year 1			Year 2			Year 3		
Month	Hogs	CW fee	Total Fees	Hogs	CW fee	Total Fees	Hogs	CW fee	Total Fees
January	-	$130	$-	-	$134	$-	-	$138	$-
February	-	130	-	-	134	-	-	138	-
March	-	130	-	-	134	-	-	138	-
April	-	130	-	-	134	-	-	138	-
May	-	130	-	-	134	-	-	138	-
June	-	130	-	-	134	-	-	138	-
July	-	130	-	-	134	-	-	138	-
August	-	130	-	-	134	-	-	138	-
September	36	130	4,671	40	134	5,292	44	138	5,996
October	-	130	-	-	134	-	-	138	-
November	-	130	-	-	134	-	-	138	-
December	-	130	-	-	134	-	-	138	-
Total	36		$4,671	40		$5,292	44		$5,996

	Year 4			Year 5		
Month	Hogs	CW fee	Total Fees	Hogs	CW fee	Total Fees
January	$-	$142	$-	$-	$146	$-
February	$-	142	-	-	146	-
March	$-	142	-	-	146	-
April	$-	142	-	-	146	-
May	$-	142	-	-	146	-
June	$-	142	-	-	146	-
July	$-	142	-	-	146	-
August		142	-		146	-
September	48	142	6,794	53	146	7,697
October	-	142	-	-	146	-
November	-	142	-	-	146	-
December	-	142	-	-	146	-
Total	48		$6,794	53		$7,697

Total cut and wrap revenue by the month

100% capture

Month	Year 1	Year 2	Year 3	Year 4	Year 5
January	$-	$-	$-	$-	$-
February	$-	$-	$-	$-	$-
March	$3,938	$4,418	$4,957	$5,562	$6,240
April	$7,740	$8,684	$9,744	$10,933	$12,266
May	$4,500	$5,049	$5,665	$6,356	$7,132
June	$4,500	$5,049	$5,665	$6,356	$7,132
July	$9,000	$10,098	$11,330	$12,712	$14,263
August	$24,300	$26,685	$29,344	$32,309	$35,617
September	$24,572	$27,621	$31,049	$34,903	$39,236
October	$19,901	$22,329	$25,053	$28,110	$31,539
November	$9,000	$10,098	$11,330	$12,712	$14,263
December	$-	$-	$-	$-	$-
Total	$107,451	$120,032	$134,137	$149,953	$167,688

10. BENEFITS AND CONCLUSIONS

The development of a local abattoir can provide a significant benefit to the overall community from the aspect of a number of factors:

One immediate benefit would be a reduction in the cost of production of meat for local farmers through reducing transportation costs of live animals and processed meat. At the present time, farmers in the Alberni valley need 2 trips to the nearest abattoir. Based on the assumption of a 110 kilometer trip, this would result in 440 kilometers per slaughter order. Assuming the producer has the equipment, the cost of truck and trailer operation could add $0.50 per kilometer in costs ($220) divided by the number of animals. A 20 kilometer haul would reduce transport costs by up to 80%.

Another benefit is the improvement in meat quality due the reduced animal stress. There are numerous research papers that deal with the impact of transport distance on meat quality in market animals. It is generally agreed that long transport times may have a harmful impact on animals. Short hauls from farm gate to a local abattoir should provide better meat quality.

Livestock production appears to be on the increase on Salt Spring Island due to the existence of a local abattoir. As noted in the survey , 67% of Alberni area respondents indicated they would increase production if there was a local abattoir. This would expand the farm sector and increase local farm income.

The increase in livestock production and the availability of local processing would result in a reduction in food travel distance from out of the region and perhaps out

of the province or even out of the country. It would also give people the security of knowing the source of what they are eating.

The proposed abattoir would create 3- 4 jobs for local people. There would be construction employment created during the construction period.

In conclusion, the abattoir could provide benefits to the local economy. In order to proceed the community will need to consider how it can support an investment of close to $500,000 for the project.

APPENDIX A

BEST MANAGEMENT PRACTICES

Best Management Practices
for *Nitrogen and Phosphorus Control*
in *Red Meat and Poultry Slaughter Plants*

October 11, 2001 Partial Draft, prepared by J. Willis Sneed of HDR, Inc.

I. Introduction

This document is intended to provide guidance for plant and corporate personnel in voluntarily establishing Best Management Practices (BMP) to control nitrogen and phosphorus in the wastewater from red meat and poultry slaughter plants. These nutrient control practices solely address in-plant waste minimization practices and do not include wastewater pre-treatment or treatment methods.

This is one part of a three-part set of documents. This part addressed BMP for the slaughter operations. The other two documents discuss BMP for cutting up the carcasses, further processing the meat, and rendering. Therefore it may be appropriate for some packing plants to use two or all three of these documents if they also cut up the carcasses, further process the meat, or render.

II. Discussion of various slaughter plant types

In the mid-1970s, the U.S. Environmental Protection Agency (EPA) divided red meat and slaughter plants into the following Segments and Subcategories:

- Simple Slaughterhouse
- Complex Slaughterhouse
- Low-Processing Packinghouse
- High-Processing Packinghouse

The plants were divided as follows

- **Slaughterhouse**. A plant that slaughters animals and has as its main product fresh meat as whole, half or quarter carcasses or smaller fresh meat cuts.
- **Packinghouse**. A plant that both slaughters and processes fresh meat to cured, smoked, canned, and other prepared meat products. **Processed meat products** are limited to: chopped beef, meat stew, canned meats, bacon, hams (boneless, picnic, water added), franks, wieners, bologna, hamburger, luncheon meat loaves, sausages.

Both slaughterhouses and packinghouses are further subdivided into two subcategories, depending on the amount of by-product processing. By-product operations include: rendering, paunch and viscera handling, blood processing, or hide or hair processing.

- **Simple Slaughterhouse**. A slaughterhouse that does very limited, if any, by-product processing; usually no more than two operations.

- **Complex Slaughterhouse**. A slaughterhouse that does extensive by-product processing; usually at least three operations.
- **Low-Processing Packinghouse**. A packinghouse that processed no more than the total animals killed at the plant and normally processing less than the total kill.
- **High-Processing Packinghouse**. A packinghouse that processed both animals slaughtered at the site and additional carcasses from outside sources.

The BMPs contained in this document are applicable to the slaughter portion of each of these plants. Many of these plants will also need to refer to BMPs for Further Processing Plants and BMPs for Rendering.

Although categorical limits were never promulgated for the poultry industry so no legal subcategorization exists in current regulations, in the mid-1970s, the U.S. Environmental Protection Agency (EPA) divided poultry plants into the following subcategories:

- Chickens
- Turkeys
- Fowl
- Ducks

These subcategories are obvious with the exception of the term "fowl", which are breeder-spent hens (heavy fowl), a few roosters, and laying hens (light fowl). From a wastewater perspective, the key difference is the presence of immature eggs in the hens, which can increases loadings from these birds.

More recently poultry plants are commonly split into the following three types of facilities:

- **Slaughter/First Processing**: A facility that simple slaughters birds and packages fresh and frozen whole birds and parts.
- **Slaughter/Second processing**: A facility that, in addition to performing the operations of first processing, also performs operations such as deboning, marinating, tumbling, IQF.
- **Slaughter/Third Processing**: A facility, which in addition to performing the operations of first and second processing, also produces a parfried or fully-cooked product. Parfried product is product that is not fully cooked. It is often done to "set" batter on a formed meat product.

The BMPs contained in this document are applicable to the slaughter portion of each of these plants. Second and Third Processing plants also need to refer to BMPs for Further Processing Plants.

III. Description of production-related activities

[pending]

IV. Typical nitrogen and phosphorus levels

In the 1974, the Environmental Protection Agency (EPA) published a Development Documents for Red Meat Processing. Included within that document are tables showing waste characteristics for each slaughter plant subcategory. Table I shows data for total Kjeldahl nitrogen (TKN) from that Development Document.

TABLE I
RED MEAT SLAUGHTER PLANT EFFLUENT TKN LEVELS
FROM 1974 DEVELOPMENT DOCUMENT

PLANT TYPE	AVERAGE	STD. DEVIATION	RANGE	NO. OF PLANTS
RED MEAT	lb/1000 lb LWK*	lb/1000 lb LWK*	lb/1000 lb LWK*	
Simple Slaughterhouse	0.68	0.46	0.23-1.36	5
Complex Slaughterhouse	0.84	0.66	0.13-2.1	12
Low-Processing Packinghouse	0.53	0.44	0.04-1.3	6
High-Processing Packinghouse	1.3	0.92	0.65-2.7	3

* Live Weight Killed

In the 1975, a similar Development Documents for Poultry was published. That document included tables showing waste characteristics for effluent from each slaughter plant subcategory. Table II shows data for the various forms of nitrogen from the Development Document.

TABLE II
POULTRY SLAUGHTER PLANT EFFLUENT NITROGEN LEVELS
FROM 1975 DEVELOPMENT DOCUMENT

PLANT TYPE	AVERAGE	RANGE	NO. OF PLANTS
	lb/1000 lb LWK*	lb/1000 lb LWK*	
Chicken			
TKN	1.84	0.15-12.16	22
Ammonia-N	0.23	0.005-0.73	19
Nitrate–N	0.0078	0.0-0.14	12
Nitrite-N	0.0069	0.0-0.037	14
Turkey			
TKN	0.94	0.038-1.89	5
Ammonia-N	0.15	0.064-0.37	5
Nitrate–N	0.037	0.005-0.092	3
Nitrite-N	0.0013	0.001-0.002	3
Fowl			
TKN	0.28	----	1

Ammonia-N	0.1	----	1
Nitrate–N	0.0044	----	1
Nitrite-N	0.00053	----	1
Duck			
TKN	1.4	0.80-2.00	2
Ammonia-N	0.79	0.062-2.52	2
Nitrate–N	0.03	0.018-0.043	2
Nitrite-N	0.0097	0.0014-0.018	2

* Live Weight Killed
Table III shows effluent phosphorus levels for both Red Meat and Poultry slaughter plants.

TABLE III
SLAUGHTER PLANT TOTAL PHOSPHORUS LEVELS
FROM 1970s DEVELOPMENT DOCUMENTS

PLANT TYPE	AVERAGE	STD. DEVIATION	RANGE	NO. OF PLANTS
	lb/1000 lb LWK*	lb/1000 lb LWK*	lb/1000 lb LWK*	
RED MEAT				
Simple Slaughterhouse	0.05	0.03	0.014-0.086	5
Complex Slaughterhouse	0.33	0.49	0.05-1.2	5
Low-Processing Packinghouse	0.13	0.16	0.03-0.43	4
High-Processing Packinghouse	0.38	0.22	0.2-0.63	3
POULTRY				
Chicken	0.39	----	0.054-2.46	22
Turkey	0.98	----	0.034-0.18	4
Fowl	0.29	----	0.27-0.31	2
Duck	0.084	----	0.073-0.096	2

* Live Weight Killed
All data in Table Nos. I-III represents plant effluents after physical pre-treatment, i.e. no chemically-enhanced pre-treatment. However pre-treatment facilities were generally less extensive in the early 1970s than is presently typical.

V. Nitrogen and phosphorus sources

A. Nitrogen

Total nitrogen is comprised of TKN, nitrate nitrogen and nitrite nitrogen. TKN is the combination of organic nitrogen and ammonia nitrogen. Table II shows that essentially all of the nitrogen in poultry slaughter plant effluents is in the form of TKN, with very little nitrate or nitrite nitrogen present. Although no effluent nitrate or nitrite data is presented in Table I for Red Meat slaughter plants, nitrate and nitrites are similarly low for these effluents as well. By far the major source of nitrogen is from the protein in the meat particles and blood in the wastewater from slaughter plants. Protein contains about 16 percent organic nitrogen. Other sources of nitrogen are the manure and partially-digested feeds from stomachs and gizzards and intestines, as well as urine. Fat contains no nitrogen, nor is any contained in carbohydrates such as sugars, starches and cellulose. The primary source of the small amount of carbohydrates in packing plant wastewater is from the animal feeds.

As protein is utilized by both aerobic and anaerobic saprophytic bacteria, organic nitrogen is broken down to ammonia. The longer the meat particles and blood are in contact with wastewater, the more the organic nitrogen will be converted to ammonia nitrogen. This is significant because organic nitrogen can be removed from the wastewater by physical pretreatment; such as fine screening, settling or flotation; but ammonia cannot because it is in solution. The longer feeds have been inside the animals, the more the proteins within the feeds will have been broken down into ammonia. All the organic nitrogen in urine has been broken down to urea, CO(NH2)2. Although ammonia is often used in the refrigeration systems at packing plants, it is not a significant source of nitrogen in the wastewater.

B. Phosphorus

A significant source of phosphorus in packing plant wastewater is also the proteins in the meat particles and blood. Lean meat contains approximately two percent (verify) organic phosphorus. Carbohydrates and fat contain small amounts of phosphorus. The manure and partially-digested feeds from stomachs and gizzards and intestines contribute to phosphorus in packing plant wastewaters. Since the general phosphorus contents in poultry plants shown in Table III were determined in the early 1970s, the use of trisodium phosphate (TSP) as a microbial agent to wash the animals has become common in poultry plants and, occasionally, in pork plants. This use of TSP can cause an appreciable increase in the phosphorus content of the wastewater from these plants. If phosphate-bearing detergents are used for cleaning, these can be a source of phosphorus in the wastewater. Boiler-water additives only contribute minor amounts of phosphorus in the wastewater.

VI. Best management practices for nitrogen and phosphorus control

The following is a list of items for consideration when establishing best management practices nitrogen and phosphorus control at slaughter plants. This list should not be considered as all-inclusive, nor are all of these methodologies necessarily appropriate for every plant. This list should be viewed as a starting point for establishing BMPs specific to each facility.

A. Blood Collection/Blood Handling: Whole blood contains about 27,000 mg/l of organic nitrogen and 300-400 mg/l (verify) phosphorus.

- Maximize Blood Collection:

1. Ensure stunning devices are properly functioning to maximize rapid bleed-out of the animal.
2. Ensure the animals are properly stuck so they are thoroughly bled out before leaving the blood collection area. In poultry plants, maintain sharp blades, and adjust blade cut depth on killers to ensure clean cuts that allow maximum bleed out.
3. Check that adequate hang time is available so that the carcass is only dripping an occasional drop of blood when it leaves the blood collection area. If necessary, provide drip pans past the blood trough to prevent blood accumulation on kill room floor. In poultry plants, strive for minimum bleed times of 45 seconds for broilers and light fowl, 60 seconds for heavy fowl, 90 seconds for turkey hens, and 120 seconds for turkey toms
4. The blood collection pit and blood troughs need to be wide enough to avoid blood splashing outside these collection devises. At corners where the animals may swing outward, it may be necessary to add splash shields to contain the blood. The blood collection system needs to be of sufficient size to hold the blood during extended shifts.
5. Dry clean blood troughs and drip pans with a squeegee, or other appropriate tool, during sanitation and, if necessary, between shifts.
6. Collect and transfer to rendering, the "first rinse" water from blood trough sanitation.
7. Where possible, avoid the use of grating and other materials and areas within the blood collection pit that pack full of blood that cannot be removed during dry cleanup.
8. Electrical stimulation of beef carcasses maximizes blood recovery from the carcasses where it can be collected. This same concept may be possible in other plants as well.

Impacts:

1. Minimizes the loss of blood to the wastewater, thereby reducing nitrogen, phosphorus and BOD in the wastewater. This is particularly important since blood is not removed in physical pretreatment devices like screens, clarifiers and flotation systems.
2. Maximizes the capture of valuable blood.

- Consider Saving Blood Plasma for Sale: Add citric acid to raw blood and centrifuge to separate out most of the plasma for sale to off-site drying operations.

Impacts:

1. Minimizes the discharge of blood plasma from blood processing/drying, thereby affecting nitrogen, phosphorus and BOD reductions.
2. The sale of plasma is profitable.

- Consider establishing a program of routine maintenance to reduce leaks and spills of whole blood or plasma.

1. Where possible, dry clean up blood spills.
2. Repair or replace pump and valve seals as required to minimize or eliminate leaks of whole blood or plasma.
3. Strive to continuously eliminate pipe and equipment blood/plasma leaks and spills.

Impacts:

1. Reduction in total P, nitrite and BOD in the wastewater.
2. Maximizes the capture of valuable blood and plasma.

B. Manure Management: The nutrient content of animal manure and urine is quite high, as shown in Tables IV and V:

TABLE IV
NUTRIENT CONTENT OF RED MEAT MANURE AND URINE

Species	**Nitrogen**		**Phosphorus**	
	mg/l	lb/hd/day	mg/l	lb/hd/day
Beef - 1125 lb/hd	5,770	0.385	1850	0.123
Hogs - 260 lb/hog	6,630	0.115	2,020	0.035

Total P in the wastewater from hog pens has been measured at 106 mg/l, which was 3.5 times higher than the total packing plant flow.

TABLE V
NUTRIENT CONTENT OF POULTRY MANURE

Species	**Nitrogen**	**Phosphorus**
	lb/bird/day	lb/bird/day
Broiler (5lb/bird)	.005	.0017
Turkey (20lb/bird)	.015	.006
Duck (8lb/bird)	.006	.0024
Fowl (6lb/bird)	.005	.0019

- Less manure is deposited in the livestock trailers and pens, cages, live holding sheds, live receiving areas and less partially-digested feeds are lost to the slaughter plant sewers from the paunch/stomach/gizzard and intestines if livestock or poultry are taken off feed before they are sent to slaughter.

Impacts:

1. Reduction of total P, TKN, BOD, and TSS in the wastewater.
2. Results in a minor reduction in feed costs.
3. Reduces potential product contamination with manure.

Comment:

1. This may not be feasible if the animals are hauled long distances.
2. This is particularly important in pork plants where there is a current trend to rest the hogs longer in the pens before slaughter.

- To the extent practical, dry clean livestock trailers, cages, pens, live holding sheds and live receiving areas before the initial hose down. Vacuums may be used to assist in this effort. This recovered material should then be land applied at agronomic rates, or landfilled if appropriate.

Impact: Reduction of total P, TKN, BOD, and TSS in the wastewater.
Comments: This is easier in beef plants and live poultry receiving and holding areas, than pork.

- Consider dry bedding cattle pens. The manure and bedding material should be land applied at agronomic rates.

Impact: Reduction of total P, TKN, BOD, and TSS in the wastewater.

- Investigate dry dumping beef paunch and hog stomachs and, to the extent possible, shake out beef pecks (omesum). This recovered material should then be land applied at agronomic rates.

Impact: Reduction of total P, TKN, BOD, and TSS in the wastewater.
Comments:

1. It is difficult to shake much manure out of the pecks.
2. Dry dumping beef paunches is far more common than dry dumping hog stomachs.

- Eliminate hashing and washing of intestines and render whole.

Impact: Reduction of total P, TKN, BOD, and TSS in the wastewater.
Comments: The cost of rendering manure in the intestines exceeds any value in the recovered product.

C. Inedible Material Management

- Red Meat: Try to eliminate the use of water to sluice meat scraps to inedible rendering or rendering trailers. This water must be drained from the raw materials before the inedible material is rendered. This leaches blood and other soluble materials out of the inedible material and sends them to the sewer. Alternatives to sluicing include screw and belt conveyors, ram-type and other solids-handling pumps, blow tanks and vacuum systems.

Impact:

1. Reduction of TKN, total P, BOD, TSS and fat, oil and grease (FOG) in the wastewater.
2. More recovery of inedible material for rendering.

- Poultry

1. Where practical, utilize vacuum system to transport lungs to inedible rendering or rendering trailers.
2. Consider usage, on a plant specific basis, of vacuum systems for hearts, giblets, paws and /or leaf fat.

Impact:

1. Reduction of TKN, total P, BOD, TSS and FOG in the wastewater.
2. More recovery of inedible material for rendering.

D. Cleaning Chemical Management: Consider switching to low-phosphorus or non-phosphorus cleaning compounds. Phosphorous-based cleaners can often be replaced with organic surfactants (butyoxyethanol) and caustic cleaners (NaOH or KOH).
Impact: This step alone reduced phosphorus in the effluent from a pork low-processing packinghouse by approximately 2 mg/l for a six percent reduction.
Comment:

1. Consider food safety concerns when evaluating a switch to a low-phosphorus or non-phosphorus product
2. Non-phosphate cleaning compounds may be less effective and more costly.
3. Caustic cleaners can harm aluminum and copper equipment.

E. Solids Removal: Improve in-plant practices to physically remove solids from wastewater.

- Red Meat Drain Management. Consider a two-tier screening system using the drain covers for coarse solids removal and drain basket screens with finer openings.

Impact:

1. Reduction of TKN, total P, BOD, TSS and FOG in the wastewater. Rapid removal of meat scraps and blood from the floors prevents the breakdown of organic nitrogen to the ammonia form, which cannot be removed through pretreatment.
2. More recovery of inedible material for rendering.

Comment: This may not be practical where large amounts of solids would quickly plug the baskets and require constant attention. In other areas, occasional plugging may force more frequent cleaning of the drains and baskets. Removal of the baskets or emptying them into the open drain must be prohibited for this to be effective.

- Poultry Solids Removal. Investigate improving screenings practices to include both primary (coarse) and secondary (fine) screening.

Impacts:

1. Reduction of TKN, total P, BOD, TSS and FOG in the wastewater. Rapid removal of meat scraps and blood from the floors prevents the breakdown of organic nitrogen to the ammonia form, which cannot be removed through pretreatment.
2. More recovery of inedible material for rendering.

F. Dry Cleanup: A meat particle on the floor is probably at least four percent nitrogen.
a. Review the design of equipment to avoid creating difficulties with dry cleanup. For example, try to minimize numerous legs on equipment that inhibit use of a squeegee or shovel for dry cleanup.
b. Assign workers during the production shift(s), at breaks and lunch to dry cleanup materials from the floors for rendering.
c. Provide tools for dry cleanup, such as squeegees, shovels, dump carts, vacuums, etc. Adapt squeegees to fit within blood troughs.
d. Consider establishing and enforcing written standard operating procedures for dry cleanup, either at the end of the production shift or at the start of the sanitation shift.
Impacts:

1. Reduction of TKN, total P, BOD, TSS and FOG in the wastewater. Rapid removal of meat scraps and blood from the floors prevents the breakdown of organic nitrogen to the ammonia form, which cannot be removed through pretreatment.
2. More recovery of inedible material for rendering.

G. Egg Harvesting from Hens. Harvest eggs from hens before evisceration.
Impacts: Reduction of TKN, total P, and BOD in the wastewater from the broken eggs.
Comments: Foaming caused by the egg whites (like a meringue) prevents The use of dissolved air flotation (DAF) for pre-treatment.

H. Water Conservation: Although there is no readily-apparent reason why water conservation would result in nitrogen and phosphorus reductions, the Development Documents for these industries all contain graphs showing that plants with lower water use per animal also had lower waste loads, on a total mass basis. Obviously less water is used, however, if a scrap of meat is picked up during dry cleaning than if it is hosed to a floor drain during sanitation, for example. This may also simply be an indication that better-run plants use less water and discharge less wastes versus poorer-managed plants in general.

- Use the appropriate pressure and volume of water for sanitation according to each application.

Impact: Reduced water requirements for sanitation.

- Consider installation of "electronic eyes" , foot valves or other devices on spray cabinets, carcass washers, eviscerating machines, chill tanks and other large water users to shut off the water when no animals are present.
- Evaluate installing water meters and monitoring potable water usage for: 1) each department within the plant, 2) each shift, and 3) individual machines that use large quantities of water, such as carcass washers, chitterling machines and stomach machines.

1. Monitoring water use on a day-to-day, month-to-month, and year-to-year basis can detect daily excursions, as well as long-term trends. Gradually increasing water use

for an individual piece of equipment may indicate spray nozzle openings are slowly wearing larger. Significant water flow during idle shifts and weekends may indicate water leaks.

2. Consider establishing baseline quantities and holding each department manager responsible for water usage for his department. Reward usage under budgeted amounts and condemn usage over budgeted quantities.
3. Encourage competition for water reductions between shifts and between different departments

- Consider establishing a program to inspect all hose nozzles and equipment spray nozzles and measure flow rates, where possible, at least annually. Replace nozzles discharging excessive flow.

Impact: Less water usage; hence less pollutant discharge.

- Use push-to-open nozzles on hoses.

Impact: Reduced water requirements for sanitation.

I. Product Loss Prevention: Consider establishing procedures to monitor wastewater pollutant loadings (TKN, total P, BOD, TSS, and FOG).

- Monitoring pollutant loads on a shift-by-shift, week-to-week, month-to-month, and year-to-year basis will reveal daily excursions, as well as long-term trends.
- Consider establishing baseline quantities and holding each department manager responsible for loads from his department. Reward quantities under budgeted amounts and condemn discharge of excessive quantities.
- Encourage competition for waste reductions between shifts and between different departments.

Impacts:

1. Reduced loadings for wastewater treatment, hence reduced waste treatment costs.
2. Problem areas are identified and corrected.
3. Allows measurement of the impact of waste reduction projects within the plant.

J. Pollution Prevention Team: Investigate establishing teams to identify methods to reduce water usage and plant waste, set goals, and monitor progress.

Impacts:

1. Reduced water usage and waste loads.
2. Recognition for employee efforts.

K. Environmental Awards Program: Consider participating in an industry-sponsored awards program or establishing corporate sponsorship of awards to plants, departments or individuals for both water and waste reduction. Plants could compete for awards with winners recognized by the industry or company management with a trophy or plaque.

Impacts: Annual savings over a $1 million/year were attributed to these projects, plus energy reduction, by one red meat corporation.

VII. BMP monitoring

APPENDIX B

Livestock Inventory Survey for Alberni-Clayoquot Abattoir Feasibility Study

Q1 Contact Information

Answered: 63 Skipped: 0

Answer Choices	Responses	
Name	**100.00%**	63
Farm Name	**80.95%**	51
Address	**100.00%**	63
Address 2	**9.52%**	6
City/Town	**100.00%**	63
Province	**100.00%**	63
Postal Code	**100.00%**	63
Country	**0.00%**	0
Email Address	**95.24%**	60
Phone Number	**92.06%**	58

Q2

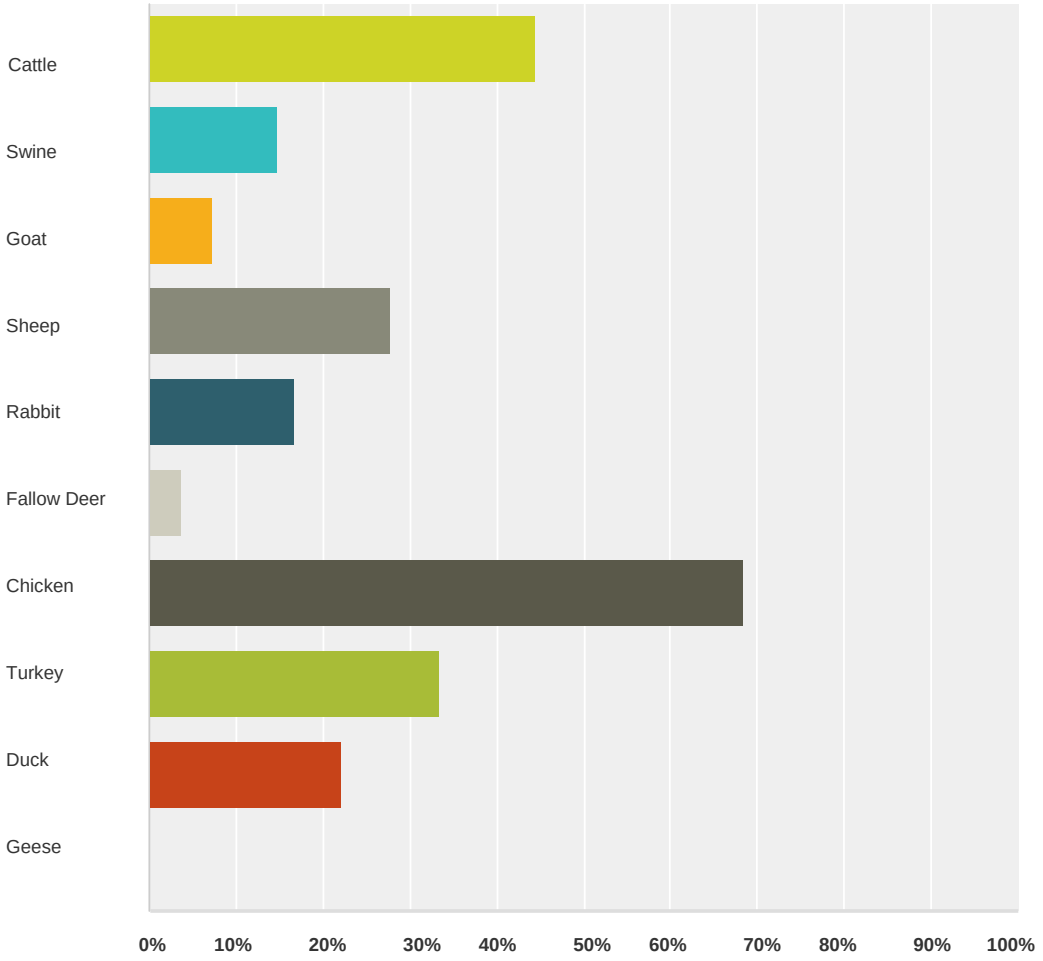
What is the size of your farm? Please specify in acres.

Answered: 63 Skipped: 0

Q3

What types of animals did you process in 2015?

Answered: 54 Skipped: 9

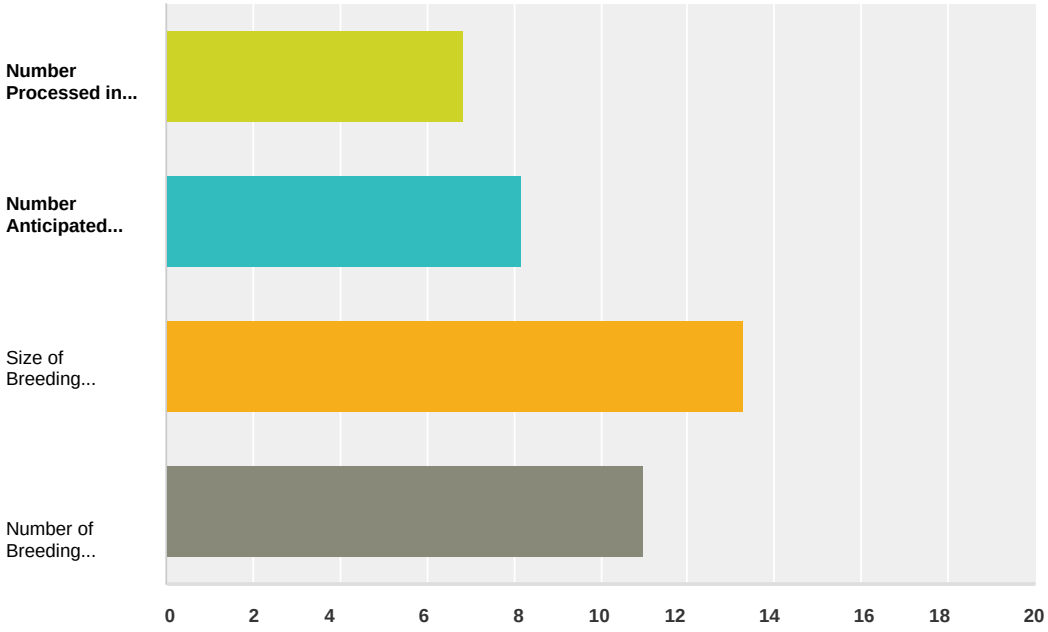


A	Responses	
Cattle	**44.44%**	24
Swine	**14.81%**	8
Goat	**7.41%**	4
Sheep	**27.78%**	15
Rabbit	**16.67%**	9
Fallow Deer	**3.7%**	2
Chicken	**68.52%**	37
Turkey	**33.33%**	18
Duck	**22.22%**	12
Geese	**0.00%**	0
Total Respondents: 54		

Q4

Cattle Inventory

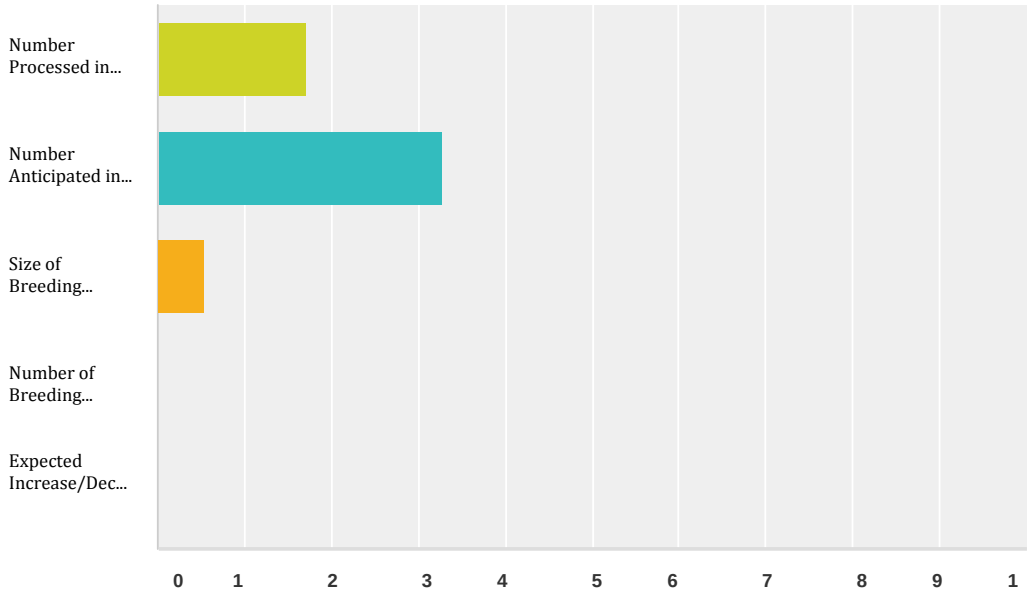
Answered: 30 Skipped: 33



Answer Choices	Average Number	Total Number	Responses
Number Processed in 2015	7	192	28
Number Anticipated to Process in 2016 Calendar Year	8	221	27
Size of Breeding Herd/Flock as of Dec. 31st, 2015	13	385	29
Number of Breeding Females	11	319	29
Total Respondents: 30			

Q5 Swine Inventory

Answered: 15 Skipped: 48

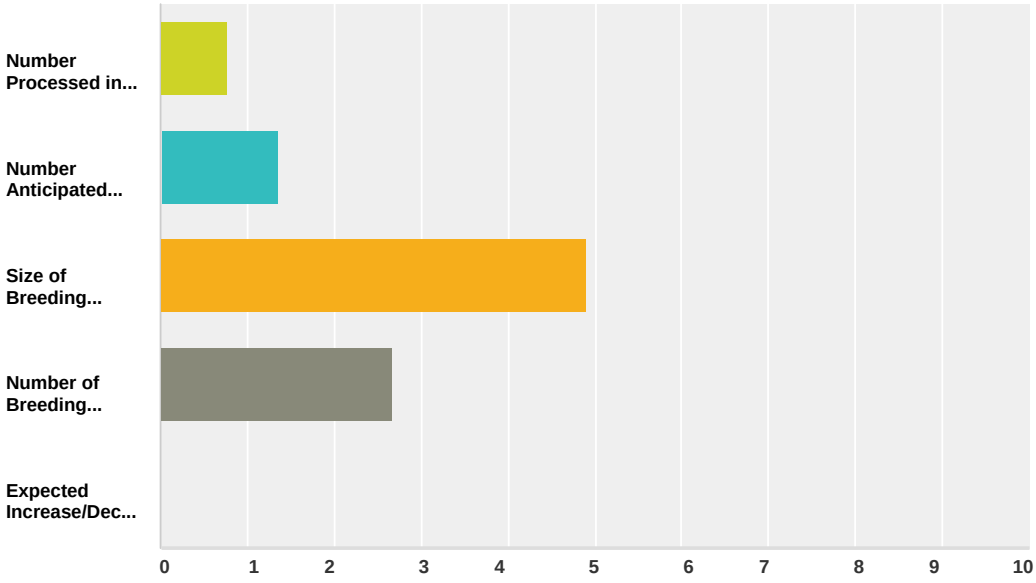


Answer Choices	Average Number	Total Number	Responses
Number Processed in 2015	2	24	14
Number Anticipated to Process in 2016 Calendar Year	3	46	14
Size of Breeding Herd/Flock as of Dec. 31st, 2015	1	6	11
Number of Breeding Females			10
Expected Increase/Decrease in Production for 2016	0	0	0
Total Respondents: 15			

Q6

Goat Inventory

Answered: 14 Skipped: 49

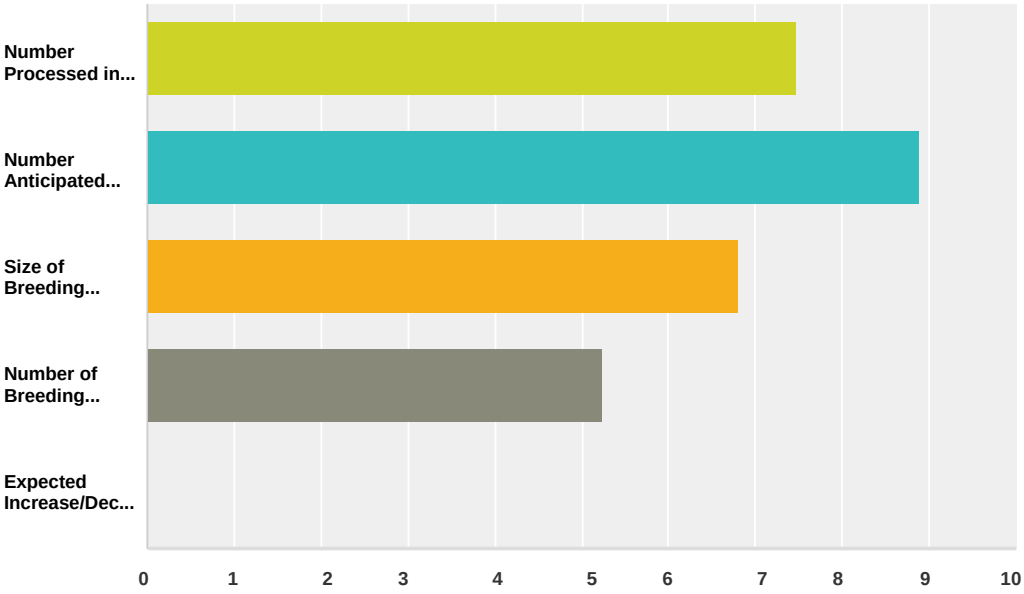


Answer Choices	Average Number	Total Number	Responses
Number Processed in 2015	1	10	13
Number Anticipated to Process in 2016 Calendar Year	1	15	11
Size of Breeding Herd/Flock as of Dec. 31st, 2015	5	49	10
Number of Breeding Females	3	32	12
Expected Increase/Decrease in Production for 2016	0	0	0
Total Respondents: 14			

Q7

Sheep Inventory

Answered: 21 Skipped: 42

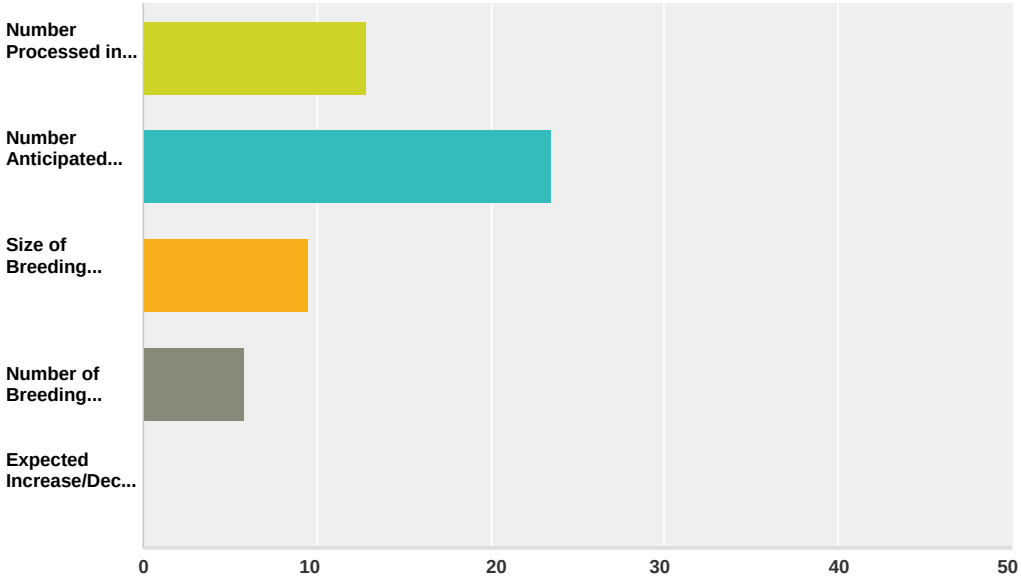


Answer Choices	Average Number	Total Number	Responses
Number Processed in 2015	7	157	21
Number Anticipated to Process in 2016 Calendar Year	9	169	19
Size of Breeding Herd/Flock as of Dec. 31st, 2015	7	136	20
Number of Breeding Females	5	89	17
Expected Increase/Decrease in Production for 2016	0	0	0
Total Respondents: 21			

Q8

Rabbit Inventory

Answered: 16 Skipped: 47

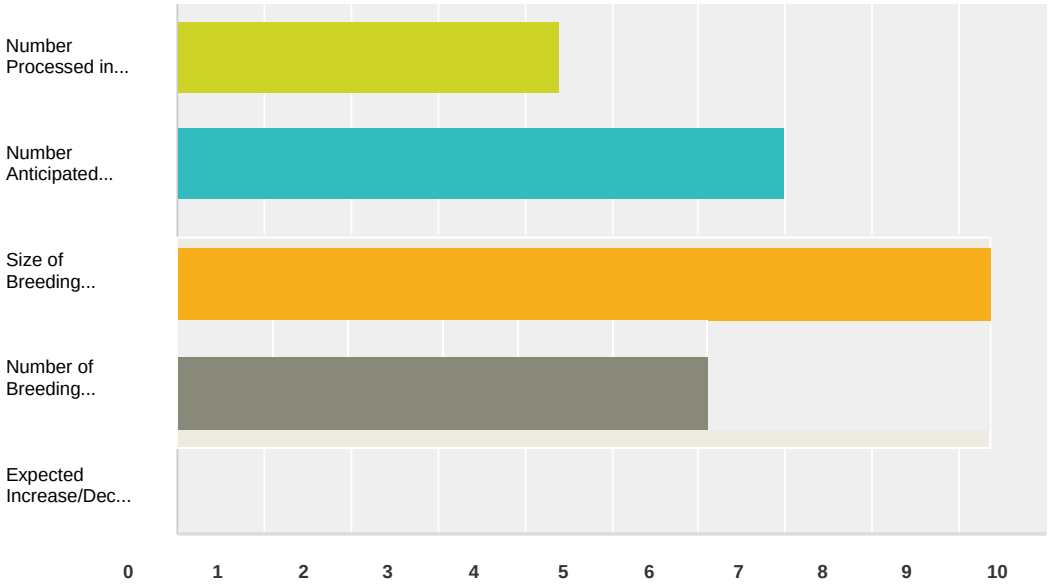


Answer Choices	Average Number	Total Number	Responses
Number Processed in 2015	13	192	15
Number Anticipated to Process in 2016 Calendar Year	24	329	14
Size of Breeding Herd/Flock as of Dec. 31st, 2015	10	133	14
Number of Breeding Females	6	82	14
Expected Increase/Decrease in Production for 2016	0	0	0
Total Respondents: 16			

Q9

Fallow Deer Inventory

Answered: 10 Skipped: 53

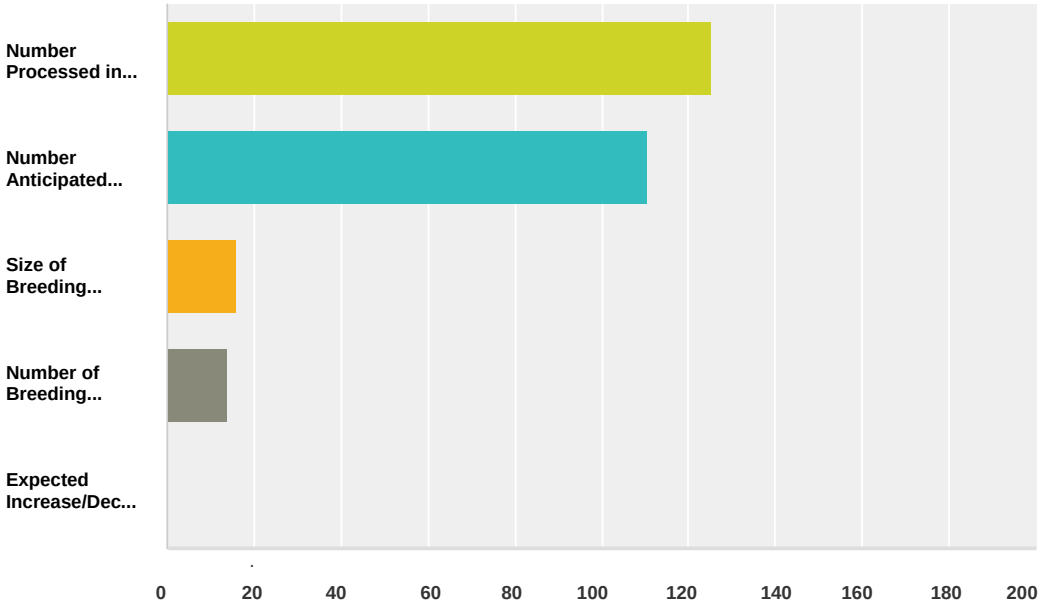


Answer Choices	Average Number	Total Number	Responses
Number Processed in 2015	4	44	10
Number Anticipated to Process in 2016 Calendar Year	7	49	7
Size of Breeding Herd/Flock as of Dec. 31st, 2015	9	75	8
Number of Breeding Females	6	49	8
Expected Increase/Decrease in Production for 2016	0	0	0
Total Respondents: 10			

Q10

Chicken Inventory

Answered: 37 Skipped: 26

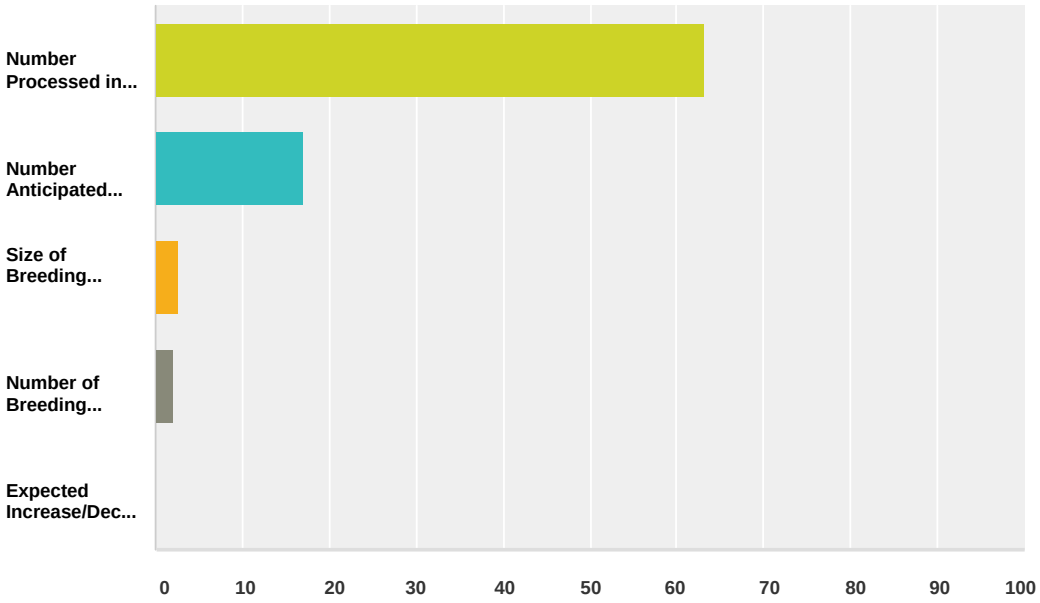


Answer Choices	Average Number	Total Number	Responses
Number Processed in 2015	125	4,514	36
Number Anticipated to Process in 2016 Calendar Year	111	3,657	33
Size of Breeding Herd/Flock as of Dec. 31st, 2015	16	431	27
Number of Breeding Females	14	373	27
Expected Increase/Decrease in Production for 2016	0	0	0
Total Respondents: 37			

Q11

Turkey Inventory

Answered: 24 Skipped: 39

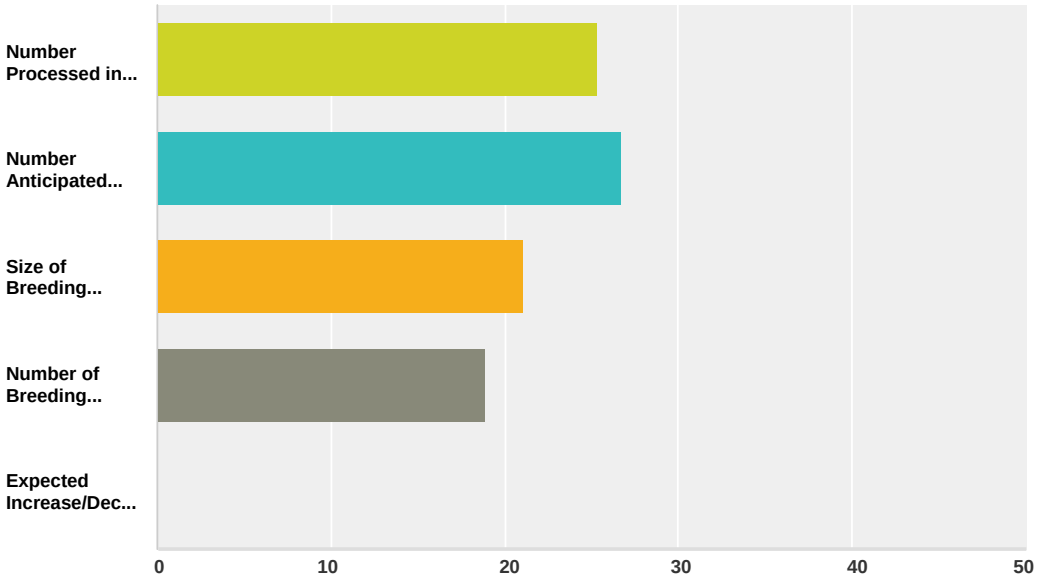


Answer Choices	Average Number	Total Number	Responses
Number Processed in 2015	63	1,453	23
Number Anticipated to Process in 2016 Calendar Year	17	343	20
Size of Breeding Herd/Flock as of Dec. 31st, 2015	3	41	15
Number of Breeding Females	2	32	16
Expected Increase/Decrease in Production for 2016	0	0	0
Total Respondents: 24			

Q12

Duck Inventory

Answered: 20 Skipped: 43

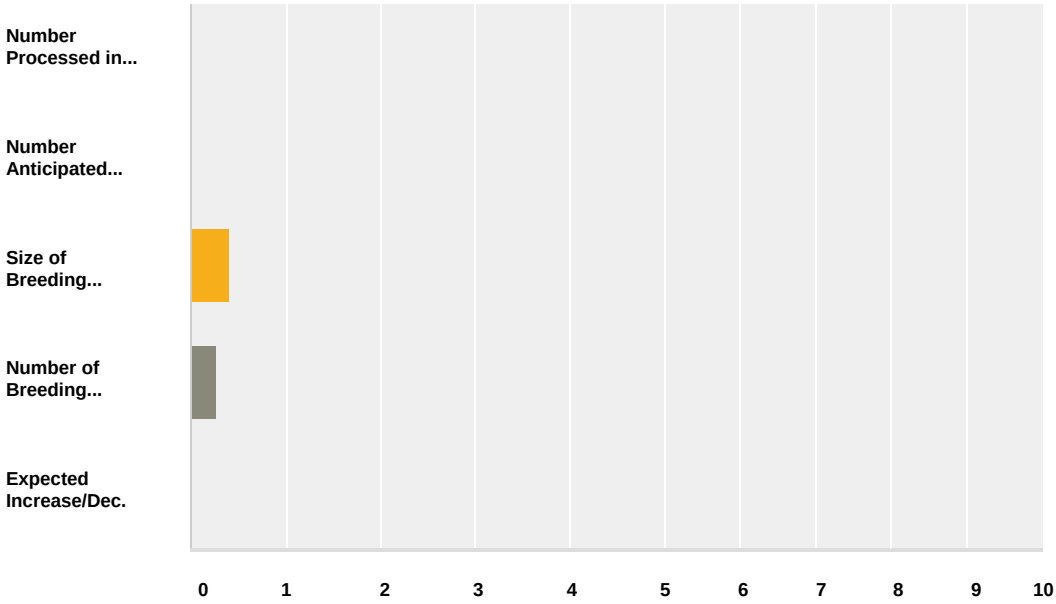


Answer Choices	Average Number	Total Number	Responses
Number Processed in 2015	25	508	20
Number Anticipated to Process in 2016 Calendar Year	27	427	16
Size of Breeding Herd/Flock as of Dec. 31st, 2015	21	337	16
Number of Breeding Females	19	302	16
Expected Increase/Decrease in Production for 2016	0	0	0
Total Respondents: 20			

Q13

Goose Inventory

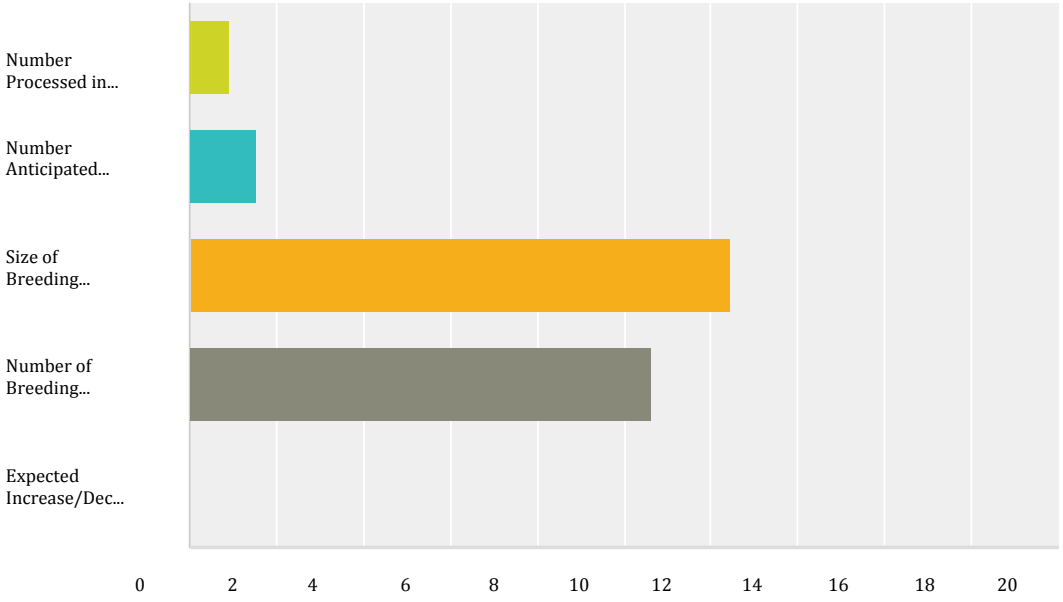
Answered: 11 Skipped: 52



Answer Choices	Average Number	Total Number	Responses
Number Processed in 2015			10
Number Anticipated to Process in 2016 Calendar Year			8
Size of Breeding Herd/Flock as of Dec. 31st, 2015	0	4	9
Number of Breeding Females	0	2	7
Expected Increase/Decrease in Production for 2016	0	0	0
Total Respondents: 11			

Q14 Other Animal Inventory

Answered: 11 Skipped: 52



Answer Choices	Average Number	Total Number	Responses
Number Processed in 2015	1	10	11
Number Anticipated to Process in 2016 Calendar Year	2	14	9
Size of Breeding Herd/Flock as of Dec. 31st, 2015	12	112	9
Number of Breeding Females	11	96	9
Expected Increase/Decrease in Production for 2016	0	0	0
Total Respondents: 11			

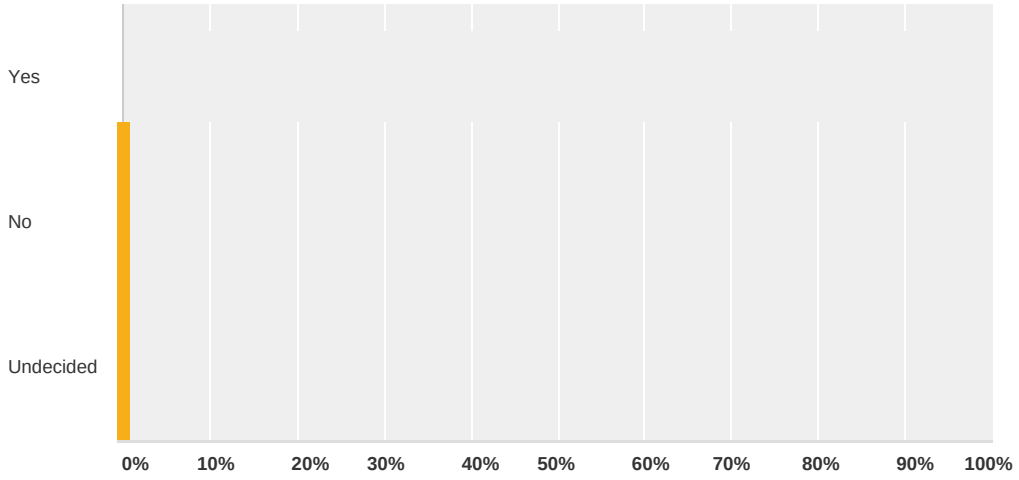
Q15 If you have laying hens, how many do you currently have?

Answered: 38 Skipped: 25

Q16

Do you expect to continue farming for the next 5 years?

Answered: 57 Skipped: 6

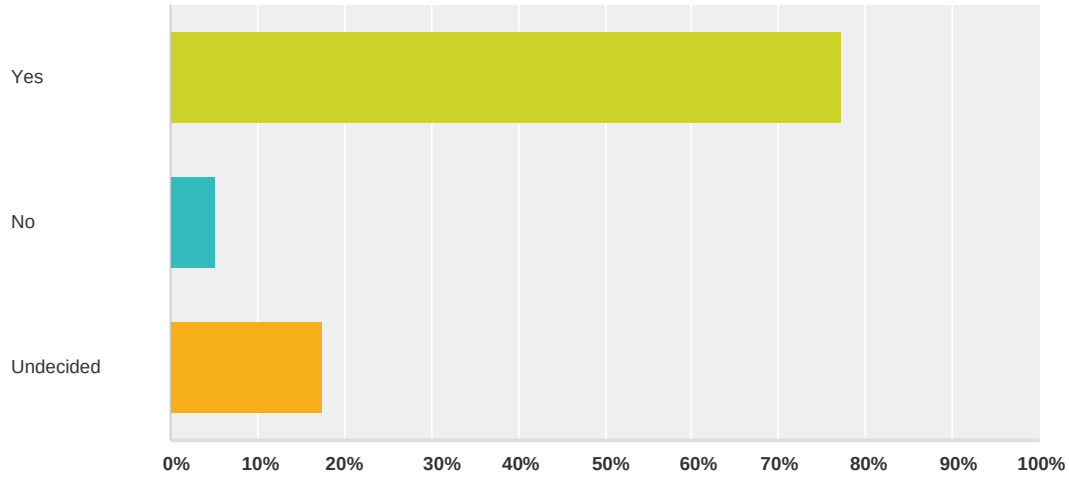


Answer Choices	Responses	
Yes	**98.25%**	56
No	**0.00%**	0
Undecided	**1.75%**	1
Total		**57**

Q17

Do you expect to continue farming for the next 10 years?

Answered: 57 Skipped: 6

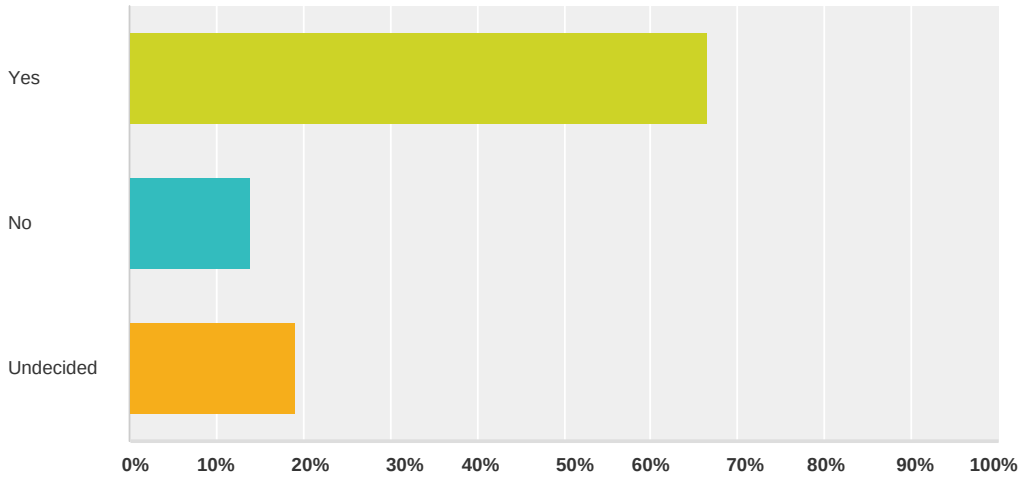


Answer Choices	Responses	
Yes	**77.19%**	44
No	**5.26%**	3
Undecided	**17.54%**	10
Total		**57**

Q18

Would the construction of a local abattoir influence your decision making process of whether or not to expand your herd?

Answered: 57 Skipped: 6



Answer Choices	Responses	
Yes	**66.67%**	38
No	**14.04%**	8
Undecided	**19.30%**	11
Total		**57**

Q19 Additional Comments:

Answered: 21 Skipped: 42

APPENDIX C

Vancouver Island Steel Buildings Ltd.
Quotation

Vancouver Island Steel Buildings Ltd.

1010 Koskimo Rd.
Qualicum Beach,
B.C.
V9K 2R6

QUOTATION

Date: April 11, 2016

Quotation #: 092

Customer:	Murray Coats
Site Address:	Port Alberni, BC
Re:	Pre-Engineered Steel Building Package

We are pleased to submit a quote, as described below:

Specifications for the Building:

Width: 32’
Length: 62’Eave height: 16’
Roof slope: 1 /12
Roof type: Symmetrical Gable
Bay spacing: 2 @ 21’, 1 @20’
Frames: 2 clear span rigid frames.
End walls: 2 post and beam end walls, non-expandable.
Roof cladding: 24 ga. SSR roof system. Galvalume.
Wall cladding: 26 ga. Wall cladding. Manufactures standard colors.
Liner Panel: none included.
Canopies: None included.
Roof Insulation: 6” WMP 50 MBI
Wall Insulation: 6” WMP 50 MBI
Gutters & downspouts: 124’ of gutter, c/w downspouts, manufactures standard colours.
Doors: 2 @ 3X7, 2 @ 6X7.
Windows: none included.
Framed Openings: none included **Overhead Doors:** none included. **Mezzanine:** None.
Overhead Crane: None.
Misc: Primary is shop primed. SP2 prep. Girts and purlins are galvanized. Base channel included.

Vancouver Island Steel Buildings Ltd.
1010 Koskimo Rd.
Qualicum Beach, B.C.
V9K 2R6

QUOTATION

Date: April 11, 2016

Quotation #: 092

Design Criteria:

BC Building Code 2012
Collateral Load = 2
Snow Load = 62.656
Rain Load = 6.683
Wind Load 1:50 = 8.145
Seismic Data
Sa (0.2) = 0.76
Sa ().5) = 0.57
Sa (1.0) = 0.30
Sa (2.0) = 0.16

Exclusions: Foundation, anchor bolts, mechanical & electrical penetrations, louvers, fans, fireproofing and fire stops, interior framing and finishes, permits, third party inspections, garbage bin, roof curbs, roof access ladders and platforms.

Building Price FOB Port Alberni, BC

Building	**$**	
41,352		
Freight	**$ 5,385**	
Install	**$ 18,500**	**Total**
	$ 65,237 plus GST	

Signed as Accepted_____Dated: _____

Option 1

26 ga. screwdown roof in lieu of SSR roof system. Deduct **$3,912** plus GST

Signed as Accepted_____Dated: _____

GST # 817955644

Vancouver Island Steel Buildings Ltd.
1010 Koskimo Rd.
Qualicum Beach, B.C.
V9K 2R6

QUOTATION

Date: April 11, 2016

Quotation #: 092

Terms & Conditions

Deposit
A 20% deposit retainer is due at the time of placing the order, by way of cash, cheque or money order made payable to Vancouver Island Steel Buildings Ltd.in CA Dollars.

Payment
Remaining balance will be due 5 business days prior to the scheduled delivery of the building package by way of Certified cheque or money order made payable to Vancouver Island Steel Buildings Ltd.

Price Changes
Any changes made to the original order, will require a change order form & prices may be subject to change.

It is the customer's reasonability to confirm the seismic and climate data.

Signed as Accepted_____Dated: _____