Teagasc Farm Buildings Conference and Demonstration

Kildalton College, Piltown, Co. Kilkenny
Thursday, 13 March 2008

Conference Programme

10.00am	Registration
10.30am	Opening Address
	Professor Gerry Boyle, Teagasc Director
	Chair: Tom Kelly, Programme Manager, Management and Technology Services, Teagasc Advisory Service
10.45am	*Financial considerations and investment decisions (costs, investment returns, tax, grants, VAT)*
	Fintan Phelan, Financial Specialist, Teagasc Advisory Service
11.15am	*Out-wintering-pad (OWP) systems*
	Padraig French, Research Officer, Teagasc Diary Production Research Centre
11.45am	*Milking facilities*
	Tom Ryan, Farm Buildings and Machinery Specialist, Teagasc Advisory Service
12.15pm	*Working with your building contractor - getting it right on site*
	Bill McEvoy, Irish Farm Building Contractors Association
12.45pm	*Specifications for farm structures*
	Robert Leonard, Department of Agriculture, Fisheries and Food

1.30pm LUNCH

Technical Demonstration 2.00pm - 4.30pm

Dairy Unit	Developments in modern dairy housing Planning new and efficient milking facilities
Cattle	Cattle housing designs for the range of suckler and beef farmers
Calves	Indoor and outdoor calf rearing facilities
Sheep	Sheep housing and handling facilities
Horses	Stables, lunging areas and other facilities
Silage Pits	Construction and design features, repairs and maintenance
Health and Safety	Issues relating to farm building work
Building Drawings	Farm layout and standard building design drawings
Trade Exhibits	

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Conference Welcome
Opening Address by Teagasc Director, Professor Gerry Boyle

Good morning ladies and gentlemen. You are all very welcome to Kildalton Agriculture and Horticulture College, here in south Kilkenny.

This farm buildings conference is particularly timely as many of you and your fellow farmers embark on major on-farm building projects. This is a critical year for farmers intending to complete building work under the Farm Waste Management Scheme by the deadline at the end of this year.

The scale of investment is unprecedented with over €1.5 billion being invested in 2007 and 2008 in new and upgraded farm facilities. That is five times the levels of investment in 2004 and 2005.

This investment in new facilities provides an important opportunity to address issues on your farm. The need for safe, environmentally friendly, animal welfare compliant and durable buildings and facilities is a reality today. The requirements to meet acceptable criteria in cross compliance and REPS is clear and no one can be in doubt but that the bar is being raised higher in terms of animal welfare, health and safety and environmental practices.

Labour retention and efficiency of labour is related to the quality of facilities on the farm. Staff and younger farmers require good working conditions if they are going to stay and they will benchmark their time and working conditions against other professions and occupations. There is the new type of farmer who is prepared to spend less than 10 hours per week to manage and run their drystock/tillage enterprise, so that they can work off-farm and have a quality family life. These new breed of farmers want to enjoy the best of both worlds. They will endeavour to maintain their asset value while maximising their income earned per hour worked both on and off farm.

The low cost wintering options using out-wintering-pads and lined lagoons is promising. They offer a low cost alterative to farmers wishing to expand quickly and to maintain flexibility.

Careful panning is required when making any significant investment. But when we have investments of the scale taking place on Irish farms today, even more careful planning is required to get it right. In this context, I look forward to the first paper at today's conference which addresses the financial decision to invest and the decisions required on repayment capacity and cash flow planning. It is sufficient to say that the co-operation of the bank, accountant and adviser are important in giving clear direction to ensure that commitments can be met. In this respect careful cash flow

planning, repayment capacity calculations based on realistic expectations are essential. Teagasc advisers provide two services: Options analysis and Profit Monitor analysis; which can provide you with the basis of sound investment decisions with or without grant aid.

If you drive in the rural areas, it is not difficult to see the historic stages of development reflected in roadside farmyards. The legacy of investment decisions of past generations are apparent "the good and the not so good". REPS and other schemes have a done a lot to improve the visual impact of farmyards. I recall an excellent evaluation by Tony Leavy and others of the Farm Improvement Programme FIP 1986-1994. Two-thirds of farmers participated over eight years, with very positive outcomes from the use of public funds. Farms were modernised, two-thirds of farmers participating expanded their business, livestock numbers expanded, profitability and labour productivity increased. The rate of return on the investment was calculated at over 60%. The more recent Farm Waste Management Scheme and Farm Improvement Scheme are again hugely popular with farmers who have responded to the grant aid incentives on offer.

(The value for money of investment grants in a primary production industry like agriculture must surely be accepted and addressed soon. Future capital investment grants will allow policy makers lead and direct the ongoing development of safe and sustainable farming)

As Director of Teagasc I must acknowledge the work of the research and advisory service staff in assisting farmers with decision making, design details, scheme applications and the vital financial advice given. They have been through two very busy years and it is a pity that some of this work must now be done in such haste.

I would also like to acknowledge the vital role of the Department of Agriculture, Fisheries and Food in setting very high standards for grant aided investment, these investments will, we hope, be durable, long lasting, meeting the needs of farmers into the next generation.

I want to thank my colleagues in Teagasc for organising this important conference and I look forward to the contributions of the various speakers this morning, and the demonstrations which will take place in the afternoon.

INVESTMENT IN FARM WINTERING STRUCTURES

Fintan Phelan, Financial Specialist, Teagasc Advisory Service
Tom Ryan, Farm Buildings and Machinery Specialist, Teagasc Advisory Service

Introduction

This paper outlines some of the factors driving the large increase in farm building recently and looks at ways to finance this investment. We examine the cash flow implications and we review the impact that the rate of income tax has on the out-of-pocket cost of an investment.

Drivers and reasons for investing

Generally most on-farm investments can be classified into one of the following categories:

- Investments that are necessary for the farm to remain in business
- Investments that will improve output or reduce costs thereby improving profitability
- Investments that will make running the business easier due to improved labour efficiency
- Investments that will allow new opportunities to be availed of i.e., a new enterprise

Much of the completed and planned farm building investment falls into the first category. The regulatory framework driving environmental requirements such as the Nitrates Directive combined with cross compliance and the threat to a farmer's Single Farm Payment, have acted as 'push' factors driving the increase in building activity. The obvious 'pull' factors are the introduction of a high grant rate combined with attractive capital allowances, and the relatively low interest rates in historical terms. Other 'pull' factors include: a need for increased labour efficiency on part-time farms; the need to retain staff on larger farms; future proofing with a view to expansion; or improving the efficiency of the farm system. The value of a building from a purely financial return perspective may be difficult to determine. This is largely due to the fact that at the time of the investment it is unknown how long the useful life of the investment will be and the difficulty in determining its residual or terminal value after this time. Slurry storage may be of use to an existing farmer now who plans to farm for the next ten years, after that point the storage may still have a value and may increase the rental demand for the farmer's whole farm. In the future it may be difficult to rent out this land without slurry storage and the cost of putting it in place at that stage may be prohibitive. With the current design and specification requirements it would be hoped that buildings would have a long useful lifespan and may well hold their value as replacement costs increase over time. The problem with farm buildings

as an asset class is that they are not liquid assets. The capital value is very difficult to realise if required and may only be achieved by the sale of the farm.

Farmers will continue to invest on farms provided they believe, that they can finance the investment, that the new investment will allow them to better utilise their existing resources, or that the non-financial benefits, combined with the financial benefits, will make the investment worthwhile.

Financing the investment

There are a number of possible sources of finance for the investment and these all have costs associated with them. The most obvious is a loan, the cost of which is the interest to be repaid. A site may be sold and have capital sale funds, there is an opportunity cost of non-sale of the asset and there may also be transaction costs and capital taxation. Personal funds may be used but there is an opportunity cost of savings forgone, and the return these funds were earning.

In most cases building projects require some borrowing. When meeting the financial institution it is important to have one's home work done. You need to know what the total cost of the building is including VAT. You need to know how much of the cost is VAT and how much of a grant you will receive. This will need to be financed in the short-term until the VAT is repaid and the grant can be claimed. For this amount of money a short-term loan or bridging loan should be set up. It should be possible to reclaim this money within six months but in some cases there can be delays, it is therefore advised to put the bridging facility in place for up to twelve months. When negotiating the rate of the main loan aim also to get the bridging finance at that rate.

The period of the loan should be set so as not to put too much pressure on the business. When calculating the repayment period, take into account living costs and any other costs that may be expected over the period. Decide the frequency of the repayments and the time of year of the payment. Many farmers set up loans to make repayments annually in December, coinciding with the payment of the Single Farm Payment. Remember that in the last two years Ireland received special approval from the EU to pay an advance or 50% of the Single Farm Payment in October but this may not be the case in future. New sources of income e.g., REPS allows the timing of the repayment to be set up to coincide with this payment. Trying to pay off a loan too quickly can put pressure on the business cash flow and impact on other financial commitments. If possible aim to repay the loan over the period of reclaiming capital allowances as the cash flow benefit from tax savings will help with repayments.

Income tax and capital allowances

Capital allowances are the method for allowing tax relief from income tax for large

capital expenditure. The Revenue Commissioners have criterion detailing what can be claimed and the period for those claims. Buildings attract a VAT rate of 13.5% on the gross cost of the building when constructed by a builder. This can be reclaimed straight away for flat rate farmers who are not registered for VAT. Capital allowances are allowed on the net cost of the building so the VAT reclaim and any grant paid are excluded from the allowance.

There are two main systems available: the first is a claim over seven years and the second is a claim over a three-year cycle. The normal system is the seven year cycle. In this system the net cost of the building is allowed as an expense against income tax at a rate of 15% for the first six years and 10% in the final year. The three-year cycle is a concession to allow capital allowances to be claimed quicker. The scheme is in place since 2005 for buildings that are necessary for the control of pollution. A nutrient management plan is required for the farm (e.g., REPS plan). Within the three-year cycle there are two alternatives, you can claim them at 33% each year or you can claim up to 50% as a floating allowance to be used at any time over the three years, the remainder is spread over the three years in equal amounts. The maximum that may be claimed in one year is 50% or €50,000 whichever is less (maximum claim €100,000 in three years). This will allow a farmer to maximise the tax saving at the top rate.

The tax relief for loan repayments is only on the interest portion of the loan, so the principal portion must be met by the farmer out of after tax income. Trying to pay off a loan too quickly can therefore put extreme pressure on cash flow in the business. This can lead to a requirement for short-term debt to finance working capital which is generally very expensive.

The period of capital allowance reclaim improves the cash flow due to the tax saving. So loan repayment period should be set, in so far as it is possible, to match the period of capital allowances.

Example

In our example we look at a farmer investing in facilities costing €136,000 including VAT or €120,000 excluding VAT. This is for a farmer who applied under the Farm Waste Management Scheme for a grant in Zone A where the grant rate is 60%. In this example we have assumed that the actual grant received is 50% of the cost to the farmer of the building, so the net cash cost to the farmer is €60,000. (A 60% grant would be worth €72,000, net cost to the farmer €48,000). The farmer requires bridging finance for the total cost of the investment while he waits for repayment of VAT and the grant to be paid. This will take six months at 6.5% interest, costing €4,420. There may also be a requirement to pay for the building in stage payments, so in Year 1 we have allowed for a bridging cost and full year on the normal loan, this

will account for payments accruing in Year 0. The money is borrowed at an interest rate of 6.5% costing €16,579 for seven years, or €7,964 for three years. The cost of the project, if financed on a three-year loan, is less than the cost if financed on a seven-year loan due to the saving in interest repayments. However, the three-year repayment period will be very difficult to achieve in most cases.

The effect of the farmers marginal income tax rate has a huge impact on the overall cash cost of the investment to the farmer in nominal terms. The cash cost to a farmer, not liable for income tax, is €80,999, this drops to €60,749 for a farmer paying 20% income tax and 5% levies(25%), and drops further to €43,739 for a farmer paying 41% income tax and 5% levies (46%). A further saving may be made by shortening the repayment period to three years helped by taking advantage of accelerated capital allowances, reducing the cost to €39,087.

Table 1. Cash cost of building

	0% Tax	Low Rate 25% Tax	High Rate 46% Tax	46% Tax Accelerated Relief (4)
Total cost €	136,000	136,000	136,000	136,000
VAT reclaim € (1)	16,000	16,000	16,000	16,000
Actual grant (50%) (2)	60,000	60,000	60,000	60,000
Net cost €	60,000	60,000	60,000	60,000
Bridging finance (6 months) (3)	4,420	4,420	4,420	4,420
Main loan (interest) (3)	16,579	16,579	16,579	7,964
Cost before capital allowances €	80,999	80,999	80,999	72,384
Tax saving €	0	20,250	37,260	33,297
After tax cost €	80,999	60,749	43,739	39,087

(1) Vat reclaim @ 13.5%

(2) Presume 60% FWM grant but actually works out at 50%, (if 60% achieved net cost €48,000, interest €17,683 total cost €65,683 vs. €80,999 for 50% grant)

(3) Finance at 6.5% for both bridging (six months) and main loan (seven years)

(4) Accelerated relief at 33.3% for three years, (at nominal values), all others on seven-year cycle

In Table 2 we look at the cash flow of the investment over the seven years depending on the rate of income. The total column equals the cash cost of the building to the farmer. This is the shortfall after VAT, grant and capital allowances, and must be met as the loan is repaid. The cash flow graph allows us to compare these cash flows visually.

In all cases the cash flow is most negative in Year 1 as the cost of the bridging finance must be met in this year. If the farmer is paying no income tax, the cash flow recovers in Year 2 and remains constant at -€10,940. If the farmer is paying tax at 25% in Year 2 the cash flow recovers to -€7,829 from there it reduces steadily up to Year 6 due to the fact that there is less interest paid at the end of a loan, so there is less available to reduce the tax bill. It drops off in Year 7 because there is only 10% of the capital allowance available in that year.

At the 46% rate in Year 2 the cash flow is -€5,219 and follows a similar trend as the 25% tax rate from that point. If the farmer claims the allowances over three years but takes a loan over seven years the cash flow is only negative to a small amount in Years 1 to 3, it then becomes negative to fall between the 46% and 25% rates because the capital allowances have run out early. If the farmer can afford to meet a negative cash flow over the next few years and takes out only a three-year loan, then the result in cash terms is the lowest cost of all, but the capital allowances have run out in Year 3 and the farmer may have to look to other means to reduce the tax exposure after that.

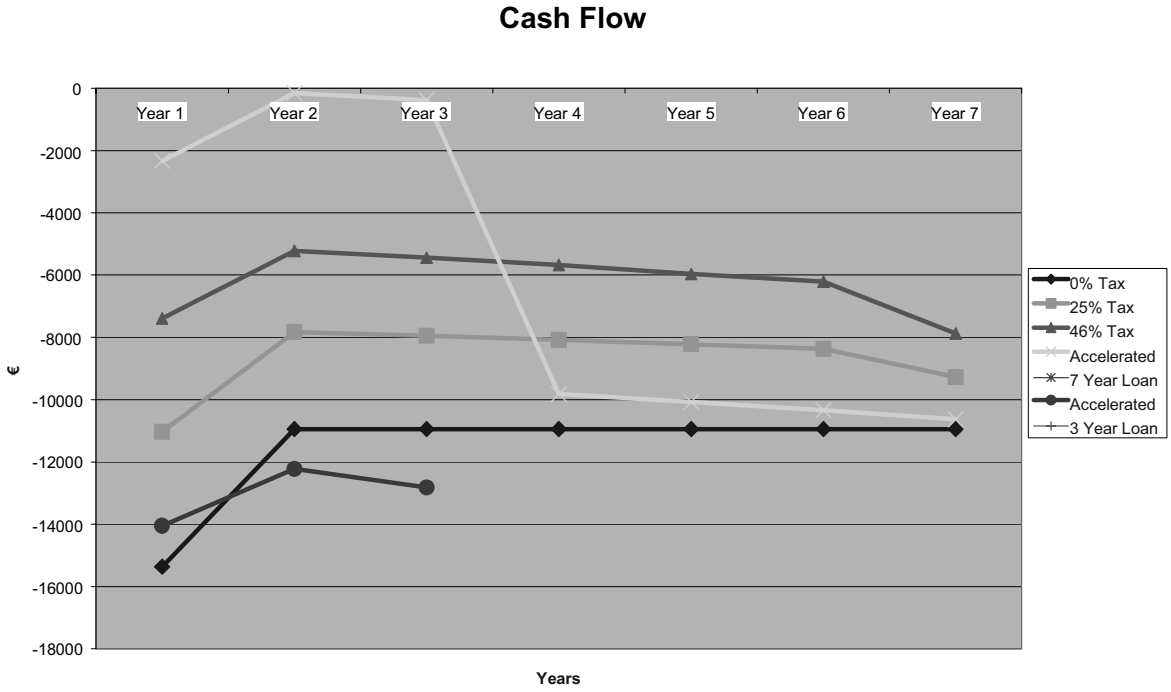
We then examined the Net Present Value (NPV) of the investments. This is a measure of how good, or bad, an investment is, and it discounts the future cash flows therefore taking account of the time value of money. In general terms, if the NPV is positive then the investment is worthwhile. In this case we took a terminal value in Year 7 of €60,000 for the investment; this assumption has a large effect on the overall NPV. Normally, it can be seen that the NPV in this case only becomes positive at the 46% tax rate. This means that the non-financial factors must be great enough to counteract a negative NPV of -€7,622 at the 25% tax rate and -€25,540 at the 0% tax rate.

Table 2. Cash flow and NPV

	Total	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	NPV(1)
0% Tax	-80,999	-15,359	-10,940	-10,940	-10,940	-10,940	-10,940	-10,940	-25,540
25% Tax	-60,749	-11,030	-7,829	-7,951	-8,081	-8,219	-8,366	-9,273	-7,622
46% Tax	-43,773	-7,393	-5,219	-5,441	-5,679	-5,964	-6,204	-7,873	+9,043
Accelerated (2) 7-Year Loan	-43,739	-2,333	-156	-381	-9,819	-10,074	-10,343	-10,633	+10,592
Accelerated 3-Year Loan	-39,087	-14,047	-12,221	-12,819					

(1) NPV (Net Present Value), terminal value of €60,000 in Year 7 assumed. If NPV is positive then the investment should be undertaken

(2) Accelerated capital allowances over three years at 33% each year



Interest rate comparison

Another important part of the equation is the rate of interest on any borrowing. Table 3 compares two interest rates for a top rate tax payer with the top line being the cash flow at 6.5% and the bottom line showing the difference if the rate were 8.5%. The nominal difference is €2,924 over the course of the loan. The difference is not as great as one might expect due to the fact that there has been tax relief on the interest. If this farmer was a low rate tax payer or paid no income tax the difference would be much greater.

Table 3. Cash flow 6.5% vs. 8.5% interest rate

	Total	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	NPV(1)
46% Tax 6.5%	-43,773	-7,393	-5,219	-5,441	-5,679	-5,964	-6,204	-7,873	+9,043
46% Tax 8.5%	-46,697	-7,623	-5,495	-5,776	-6,081	-6,412	-6,770	-8,540	+4,850
6.5% vs. 8.5%	-2,924	-230	-276	-335	-402	-448	-566	-667	-4,193

Conclusions

There has been a huge upswing in farm building activity in the last two years that has been driven by factors that are external to the core economics of farm enterprises. While there is an increasing need to improve labour efficiency the major two drivers have been the attractive grant rate and the greater environmental demands on agriculture.

- Every individual farmer, in conjunction with their family, has had to decide on their future direction. For some this has meant a change of enterprise or a reduction in the intensity of their farming. For others they will need to, or have already spent substantial amounts of money on their farm facilities.

- The aim for farmers borrowing now must be to arrange or manage any farm debt to reduce its overall impact on farm income. In some cases there may be reduced costs or new income sources to meet the repayments.

- A major help in reducing the cost of the investment are the available capital allowances. The marginal rate of income tax paid by the farmer has a large effect on the overall out-of-pocket cost of the investment.

With the amount of money involved it is vital for every farmer to make best deal possible when negotiating for finance and to consult with their adviser or accountant on how best to avail of the capital allowances.

OUT-WINTERING-PAD SYSTEMS

Padraig French, Research Officer, Teagasc, Moorepark Dairy Production Research Centre

Introduction

The provision of winter accommodation and feed is the single biggest cost in Irish systems of milk and beef production. The increasing cost of inputs outside of the farmers control such as labour, oil and building materials are continuously increasing the wintering cost of stock. The main cost contributors to our conventional wintering system are the massive capital requirement for construction, and the labour and machinery requirement of drawing the feed to the stock.

Any alternative wintering system to conventional facilities needs to have a low capital cost, a low running cost, be labour efficient and be environmentally secure. It is also imperative that any alternative wintering system has no negative impact on animal productivity or welfare.

An out-wintering-pad (OWP) is an alternative method of accommodating cattle to conventional sheds. The OWP provides a drained lying area outdoors for the animals on a bed of woodchips. The OWP is operated at a much lower stocking rate than conventional accommodation, however, the effluent produced from an OWP has a high concentration of pollutants. Underneath the drainage system the effluent is contained by a soil or plastic liner and the effluent is collected and stored before being recycled onto a suitable crop. The woodchip bed retains most of the nutrients produced by the livestock and these woodchips are also recycled onto a suitable crop such as grass.

Beef cattle

A series of experiments carried out at Grange Research Centre have demonstrated that cattle accommodated on an out-wintering-pad (OWP) had higher feed intake and growth rate than those accommodated in a slatted floor shed. A number of parameters vary between an OWP and a slatted floor shed including space allowance per animal, underfoot surface and indoor versus outdoor environment. The objective of this last study was to determine if environment (indoor vs. outdoor), space allowance or surface type (slat vs. buttchip) was contributing to the improved animal performance on OWPs.

Ninety Charolais crossbred steers approximately 535kg were assigned to one of six groups. The first three groups were accommodated indoors in a conventional slatted shed. Animals were either housed in a slatted floor pen at 2.7 or 10.4 m^2/head or on an indoor woodchip pad at 10.4 m^2/head. The remaining three groups were accommodated outdoors, where animals were either in a slatted floor pen at 2.4 or 10.4 m^2/head or on a solid floor OWP facility bedded with woodchip material at 10.4 m^2/head. All cattle were offered a total mixed ration consisting of approximately 50% concentrates and 50% grass silage on a DM basis.

Table 1. The effect of winter accommodation system on growth, kill-out proportion, feed intake and efficiency of finishing beef cattle

Conditions	Inside			Outside		
Surface	**Slats**		**Pad**	**Slats**		**Pad**
Space allowance (m^2/hd)	**2.7**	**10.8**	**10.8**	**2.7**	**10.8**	**10.8**
Liveweight gain (g/day)	972	1,289	1,408	1,088	1,258	1,419
Carcass gain (g/day)	577	701	767	574	694	782
Kill-out proportion	542	537	536	531	537	535
Feed intake (kg DM/day)	10.1	10.5	11.0	10.5	10.7	11.0
Feed efficiency	17.6	15.0	14.3	18.3	15.4	14.1

Similar to previous experiments the animals on the OWP had substantially 35% higher carcass growth rates than those indoors on slatted floor sheds at 2.7m^2 space allowance (Table 1). Approximately 60% of the advantage was achieved by increasing the space allowance from 2.7m^2 on to 10.4m^2 on slats and the remainder was achieved by providing a softer lying surface in the form of woodchips. There appeared to be no production advantage to accommodating animals outdoors rather than indoors.

Economic assessment

In order to compare the complete cost of each accommodation system, an economic assessment was made of all of the varying costs associated with achieving a carcass gain of 66 kg on a continental steer. These costs included: feed and feeding costs; depreciation and interest on working and fixed capital; slurry; effluent and woodchip spreading; bedding material; and labour associated with bedding. For the purpose of the analysis all effluent from the pad was stored in a clay-lined earth-bank-tank (EBT), which Teagasc has demonstrated to be environmentally secure. Silage was costed at €117/tDM and concentrate at €250/t fresh weight. The capital cost of construction was financed over 15 years at 5% and depreciated over 20 years and cattle purchase was financed at 6%.

Because the cattle on the pad had higher daily gain, they required less time to reach slaughter weight thereby reducing total feed intake, labour associated with feeding, and less working capital, resulting in a cost reduction of about €75 over the animals in a conventional slatted floor shed.

Where a slatted floor shed is already in existence the most attractive option is to construct an OWP adjacent to the shed and allow the animals' access to the shed for feeding and to the pad for lying. In this situation the number of animals accommodated can be increased and the costs of finishing the animals can be reduced significantly. A previous experiment at Grange shows that this type of accommodation gave similar benefit in animal performance over slatted floor sheds as accommodating animals full-time on the pad.

Table 2: Variable and fixed costs associated with different winter accommodation systems for finishing cattle

	OWP	WP attached to existing shed*	Slatted floor shed	Shed with 60% grant
Time to slaughter (days)	85	85	115	115
Total feed consumed (kgDM)	935	935	1,161	1,161
Labour feeding cost	29.8	29.8	40.3	40.3
Cost of feed and feeding €	180	180	223	223
Opportunity cost of capital €	15.4	15.4	20.8	20.8
Bedding and slurry spreading cost €	40.9	40.9	21.8	21.8
Variable costs €	**236.3**	**236.3**	**265.6**	**265.6**
Construction costs €	171.5	104.0	1100.0	510.0
Depreciation €	7.2	4.4	38.0	15.5
Interest on capital investment €	5.6	3.4	30.5	14.2
Total Costs €	**249.1**	**244.1**	**334.1**	**295.3**
Cost/kg carcass gain (€)	**3.77**	**3.70**	**5.06**	**4.47**

*Assumes shed is already paid for

The costs outlined in Table 2 do not include all costs associated with winter finishing such as mortality, transport, levies and veterinary fees. These will typically add an extra €40 per animal but are common to all systems. However, in all situations the cost per kg carcass gain is higher than the price received per kg at slaughter, even when the highest prices recorded this spring are included to calculate carcass value.

Dairy cattle

Over the last three years, research at Moorepark evaluated a range of alternative systems for wintering dry spring-calving cows and focused on the impact of these systems on production (body condition scores, weight and feed intake), labour input and running costs, health (hoof health, dirtiness score, mastitis levels, limb lesion score, locomotion scores and any incidences of clinical disease) behaviour and environmental impact.

A range of alternative designs of out-wintering-pads were constructed in Ballydague in autumn 2004. These pads were used as a complete winter facility for herds of approximately 50 spring-calving cows for the winters of 2005, 2006 and 2007.

The four winter accommodation systems compared over the two years were:

(1) Indoor cubicle housing with one rubber-matted cubicle/cow

(2) An uncovered OWP at a space allowance of 12m^2/cow with easi-feed silage system

(3) An OWP with a self-feed silage system on the OWP at a space allowance of 16m^2/cow and 4m^2 of silage/cow

(4) An OWP at a space allowance of 6m^2/cow with a windbreak and plastic cover overhead. All cow groups except the self-feed systems had a concrete feed face adjacent which allowed 0.6 m of feed space/cow. Because of the delays in setting up the experiment the silage used on the self-feed system was harvested much later and of lower quality (65 DMD) than that of all other treatments (72 DMD) in the first winter (2005) but was of similar quality to the other treatments in 2006.

Table 3. The effect of winter accommodation system on performance of spring-calving dairy cows

	Conventional shed	**Self-feed**	**Easi-fed**	**Covered pad**
2005 results				
Silage intake (kgDM/hd/day)	10.3		11.2	10.3
Milk solids yield (kg)**	418	434	424	428
Condition score change	0.074	-0.063	0.027	0.13
Mastitis				
Pre-calving	2	2	2	2
Post-calving	1	2	1	0
2006 results				
Silage intake (kgDM/day)	10.2	9.9	9.8	10.4
Milk solids yield (kg)***	345	363	356	345
Liveweight gain (kg/day)	0.65	0.57	0.60	0.52
Condition score change	0.15	0.19	0.13	0.27

In autumn 2004 silage quality on self-feed pad was much poorer due to late harvesting,**Kg fat and protein from calving to Nov. 1, 2005, *** Kg fat and protein from calving to Oct 22, 2006.

The performance and welfare results from both years are shown in Table 3. The cows on the self-feed pad had poorer condition score gain in the first winter, probably due to the poorer silage quality; however, it had no negative impact on their subsequent milk production. The cows on the outdoor pads had approximately 4% higher milk solid yield in the subsequent lactation. There was no negative impact of wintering cows on pads on cow welfare and some minor improvements in welfare traits such as hoof and limb condition at calving and behaviour during the dry period.

Table 4 outlines the capital (excluding VAT) and operating costs of a range of alternative winter accommodation systems in two scenarios. In Table 4 the rainfall figures of 37 mm/week and a 16-week winter storage requirement are similar to those in Cork. In all cases the initial capital investment was depreciated at 5%/annum and the capital investment was financed with borrowed money at 6% interest.

The current upper grant limit of €120,000 would build conventional facilities for approximately 45 cows. However, in facilities designed for relatively small herds of cows it is likely that labour input figure will be far in excessive of the figures used in this exercise which were achieved on the most labour efficient farms with over 100 cows.

In both scenarios, self-feeding silage on clay-lined OWPs with clay-lined tanks for slurry storage was the most economically and labour efficient system for wintering cows on a grass silage diet. However, certain soil types will not be suitable for the construction of the structures and in that situation plastic lined OWPs and plastic lined slurry tanks are the most economically attractive options.

Table 4. The effect of winter accommodation system on construction cost, operating cost and annualised housing cost, assuming different grant rates, a 16-week closed period, and 37mm/week winter rainfall

		Plastic-lined		Clay-lined	
	Conventional shed	**Self -feed OWP**	**Easi-feed OWP**	**Self-feed OWP**	**Easi-feed OWP**
Construction costs					
Pad area		18	12	18	12
Slurry storage requirement m^3	5.28	12.19	9.71	12.19	9.71
Lying area/cow (€)	1,350	198	132	108	72
Slurry storage cost (€)	655	390	311	183	146
Head feed cost/cow (€)	295		81		81
Silage pit cost (€)	205		200		200
Total construction cost (€)	2,505	588	724	291	499
Depreciation and interest (€)	200	47	58	23	40
Running cost (€) (100-day winter)					
Cleaning & bedding (€)	10	20	13	20	13
Slurry spreading+ agitation (€)	8	14	11	14	11
Wood chip spreading (€)		16	9	16	9
Feeding (€)	37	6	37	6	37
Sub total (€)	54	56	70	56	70
Total housing cost/cow/year (€)	254	103	128	80	110
70% grant on eligible fractions (€)	134	85	103	N/A	N/A
40% grant on eligible fractions (€)	174	85	104	70	94

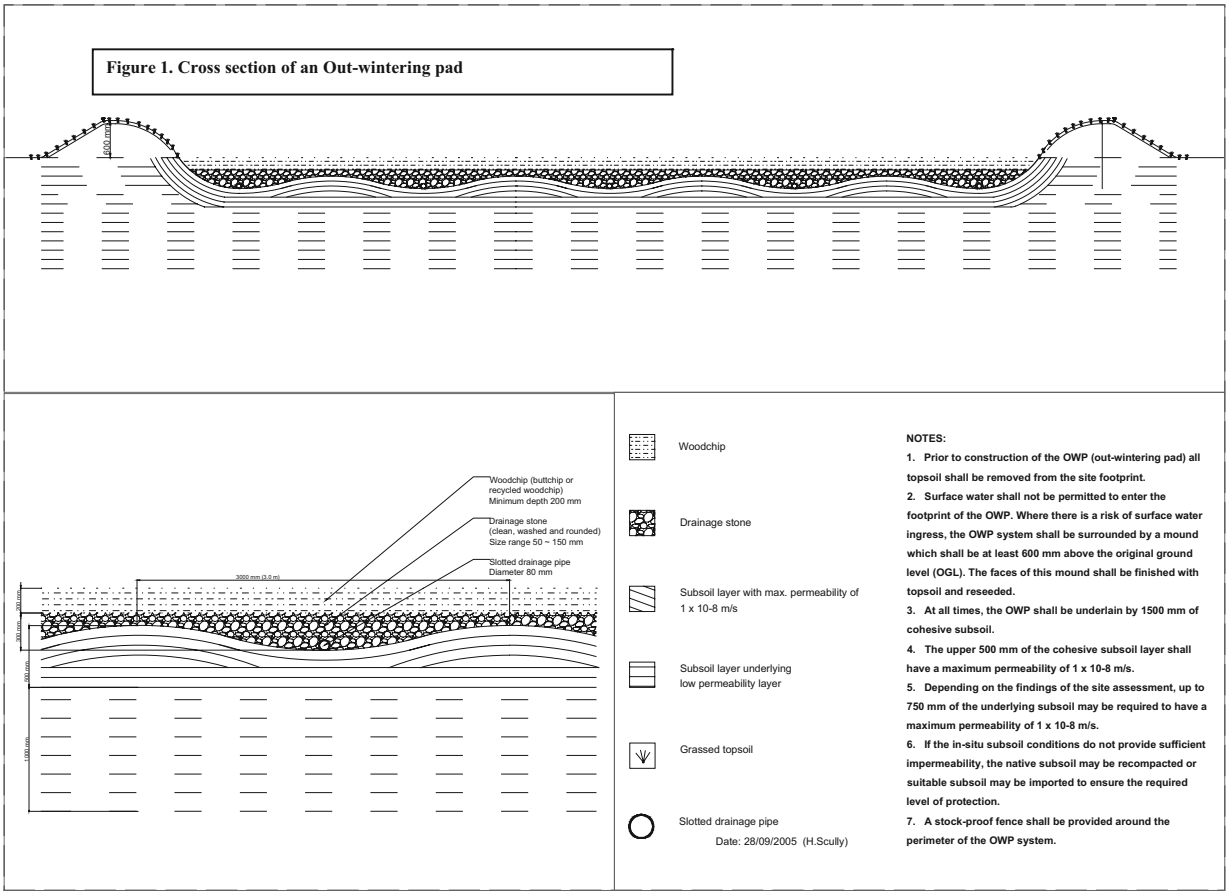
There are a number of other advantages to these structures which are not evident from Tables 3 and 4 such as:

1. They are very flexible in the types of animals that can be used which could be beneficial if enterprise mix on the farm is changed in future.
2. Because a bigger proportion of their costs are associated with running costs rather than capital costs, if the dairy enterprise is ceased before the end of lifespan of the facility the subsequent costs are reduced further relative to high cost conventional systems.

Planning an out-wintering-pad

All out-wintering-pads require planning permission. Because an OWP depends entirely on subsoil to prevent leaks, such a structure shall only be built after a "Site Assessment Report" has been completed by an approved site assessor. A planning application is then prepared and, together with the completed and signed site assessment report, is sent to the Local Authority for application for full planning permission. Some locations will be unsuitable for subsoil-lined out-wintering pads, by virtue of the presence of very close underlying rock; unsuitable subsoils such as sand or gravel; high water tables; or other adverse conditions. Such locations may necessitate lining the OWP with a geomembrane. The OWP must be built in accordance with DAFF specifications S132 and certified by the construction contractor which is the liner supply company in the case of geo-membrane lined OWPs. The specification is available at: http://www.agriculture.gov.ie/areasofi/fds/S132OWPSpecFeb2007.pdf or from your local Teagasc office.

Figure 1 shows a typical cross section of a soil-lined OWP



MILKLING FACILITIES

Tom Ryan, Farm Buildings and Machinery Specialist, Teagasc Advisory Service
Dr Eddie O'Callaghan, Research Officer, Teagasc, Moorepark Dairy Production Research Centre

Good milking parlours are an essential part of modern milk production. A good milking parlour should make the milking operation labour efficient, hygienic, reasonably fast and comfortable for both the cows and the milkers. Cows should always be milked quickly and completely with a minimum of time spent standing waiting before or after milking. The milker should be able to cope without omitting parts of the routine or over-milking cows.

Many farmers are taking a closer look at their milking parlours with a view to adding extra units or upgrading with a new milking machine altogether. Whether to build a new parlour or to extend/renovate an existing one will depend on: the general condition of the existing parlour; the suitability of its location; the width of the parlour; the depth of the pit; room for expansion; the costs involved; and whether or not the building work can be done in the dry period.

Location of milking parlours

The location of a milking parlour relative to the wintering unit and the main farm roadway can have a major impact on the labour in milking. In the mid-eighties most new milking parlours were located adjacent to the wintering unit or under the same roof as the wintering unit.

The main advantages of this design are:

- The time to bring cows to the milking facility is reduced compared to units where the milking parlour is a functionally separate building
- Cows can be diverted directly back to the wintering unit
- The holding yard can be a multi-purpose yard for cattle handling
- When the holding yard is slatted the time for yard washing is minimised
- Groups of cows can be returned and procured from the cubicle section of the unit while milking is in progress
- The quantity of yard washings can be minimised
- The cubicle and feed passages can be used to hold cows if cow numbers are increased

Disadvantages

Expansion may be limited particularly when the dairy is constructed at the front of the milkers pit and a slatted tank is placed in the holding yard with the last milking unit adjacent to the slatted tank. When these units are being planned adequate space

should be left for additional milking units, also the dairy should be sized to accommodate a larger tank. Expanding the number of milking units from say eight to 12/16 is regarded by many as radical. However, the decision to expand is rarely regretted.

Existing parlour assessment

Farmers building a new parlour or upgrading or extending an existing one are in a better position to justify the investment if they can identify some faults and failings in the existing parlour. For most people, providing more units is the ultimate aim. So, existing parlours have to be looked at with this in mind. Is there room to add on extra units at the back, or is it feasible to add units at the front? It is fine going forward if the dairy is already at the side. If the only option is to go forward and the dairy is at the front, then a new dairy may have to be built at the side.

Is the structure sound and is the roof in good condition? Roofs in many existing parlours can be in poor condition and are often quite low. Rafters may be rotten and roof lights absent. If lofts are present they tend to be low and can make the parlour very dark. Animals are more inclined to enter bright parlours as opposed to dark ones.

Internal width

A more important question is whether or not the present milking parlour is suitable for some of the modern milking machines. The big problem, of course, is the width. Many old parlours were put into old cow byres which are just about wide enough for herringbone milking machines with 914mm (3ft) centres. Indeed some of these parlours haven't enough width even for the herringbone milking machines. Cows are short of space because the cow standings are too narrow. They are too narrow because the width wasn't there in the first place and also because of poor trough and rump rail design.

Rump rail design

In many old parlours the rump rail is a single zigzag rail with some intermediate vertical supports and in others it is a vertical double rail supported at either end of the pit and from above. The single zigzag rail helps to create room for cows but the intermediate supports can lead to hand/arm injuries from kicks. The single rail also leaves the cow a lot of room to kick. The problem with the old type double rump rail is that invariably the rails are placed directly above one another and in from the edge of the pit. This reduces the cow's space in the cow standing. Look for the shine on the rail. If the shine is on the top rail only it indicates that the top rail is possibly limiting the cow's room in the standing. Another problem is that the frame supporting the rump rail from above can also make cows uncomfortable during milking. If the pipes supporting the rump rail from above meet the rump rails vertically, then, they are

usually restricting the cows nearest to them. If there is a shine on these pipes then you know they are in the way and pressing against cows' hips during milking. Drawing 3 shows the newer and better rump rail design which is commonly used nowadays. The pit-side edge of the top rail is usually vertically aligned with the edge of the pit and the cow side of the lower rail is usually 125mm (5 inches) in towards the cow. The height of the lower rail above the cow standing should be about 640mm (25 inches). Similar rump rail designs are used for 762mm (2' 6") and side by side parlours. Some designs have a zigzag top rump rail (usually used with a straight/adjustable breast rail) and a straight lower rail.

Shaky frame

Very often in old parlours the whole frame supporting the rump rails is in poor condition and poorly designed. Single rump rails with intermediate as well as corner supports have often been replaced by modern type double rump rails without strengthening the frame supporting them from above. Catch the frame and give it a good shake. If it is not secure, all sorts of problems can occur. The most serious one is that the slope in the milk line is changed from sloping towards the receiver jar to sloping away from it, very possibly leading to mastitis, cell count, hygiene and drainage problems.

Straight concrete troughs

The straight concrete trough also causes problems. It can work well if extra width in the cow standing is provided for it. It can give cows too much of a chance to move forward and back in the cow standing during milking. If extra width is not provided then the cow's upper part of the front leg is pressed hard against it and she is uncomfortable in the way she stands and where she puts her front legs. Zigzag troughs allow cows to fit comfortably square-on to the trough and stand with their legs not touching the trough. The zigzag metal troughs have the edge over zigzag ones built with concrete blocks. If concrete troughs are used they must be located/shaped correctly and allowance must be made for the extra width they take up compared to metal troughs. The metal troughs make it easier to wash the cow standing, because the washings flow in under the troughs and along straight walls or into channels at the side of the parlour.

Parlour designs

The range of widths and other critical dimensions for the herringbone, the 2' 6" and the side-by-side parlours are shown in Table 1. These are guidelines – consult the milking machine manufacturers to get the exact dimensions for their machines.

Table 1. Range of dimensions for milking parlours

Parlour type	Width of cow standing	Width of pit	Internal parlour width*	Length of cow standing per cow
Herringbone	5' 3" to 6' 6"**** (1.6 to 2m)	4' to 6' (1.2 to 1.8m)	14' 6" to 19' (4.4 to 5.8m)	3' (914mm)
2ft. 6 inch	6' 3" (1.916m)***	4'6" to 6' (1.37 to 1.8m)	17' to 18' 6" (5.2 to 5.7m)	2' 6" (762mm)
Side-by-side	8' to 8' 6" (2.4 to 2.6m)	4'6" to 6' (1.37 to 1.8m)	20' 6" to 23' (6.25 to 7m)	2'2"/2'3"/2'4"** (660/685/710mm)

* A passage outside the troughs is not taken into account

** The wider widths allow for the width of the dividing bar between the cows with sequential bailing

*** Some milking machine manufacturers opt for a slightly smaller cow standing width, depending on their trough dimensions and the position of the rump rail in relation to the edge of the pit

**** Covers the full range of possibilities: zigzag metal and concrete troughs, straight concrete troughs, and breast rails. Problems arise where the smaller widths are coupled with straight concrete troughs and badly designed rump rails.

Note: Where is the "width of the cow standing" and the "length of the cow standing per cow" measured from? The "width of the cow standing" is measured from the internal wall (where there is no feeding passageway) of the parlour to the edge of the pit and the "length of the cow standing per cow" is the actual length each cow takes up along the length of the parlour, e.g., 3', 2'6", 2' 4", and can be measured from one milk entry to the next on the milk line.

The Herringbone milking parlour is the standard parlour that came in the late 60s. Each cow takes up three feet (914mm) in length along the cow standing and the clusters are attached in front of the hind legs, although nowadays many farmers attach them between the legs. The angle of the cow to the line of the pit is about 30 degrees. The reasons for moving away from this type of parlour are because the pit gets very long with lots of units and the angle the cow is to the pit makes it more difficult to attach the clusters between the legs. The cow also has more scope to move forward and back.

In 2'6" parlours each cow has 2'6" (762mm) along the length of the parlour. The cow is at about 50 degrees to the line of the pit, so her rear end is more turned towards the milker making it easier to attach the clusters between the legs. There is good control of forward and back cow movement.

In the side-by-side parlour each cow takes up 2 ' 2 ", 2' 3" or 2'4" (660mm, 685mm or 710mm) along the cow standing and the cow is turned at almost right angles (85 degrees) to the line of the pit. The cow takes up the least amount of space along the standing and it is easy to attach clusters between the legs. There is also very good control of the forward and back movement of the cow along the standing. A width of 2' 4" (710mm) is generally recommended, because even if you don't fit the sequential bailing initially, it can be done at a later stage without major changes to the machine.

Parlour type

Which parlour type to go for is a question often asked. I think there is no clear-cut answer. Adding on to an existing herringbone is fine if the parlour and milking machine are in good condition and the installation is done correctly. A few extra units could be added with minimum cost and disruption. It would probably mean that the machine wouldn't be up to latest standards, but it would still be up to a standard comparable to the Moorepark recommendations of the early 90's and beyond. If the milking machine in a herringbone parlour is in need of a substantial up-dating or a lot of extra units are needed, then there is usually little option but to go for a new milking machine and the thinking then is to go for either the 2'6" or the side-by-side swing over type parlours. The double up type parlour is another option, which is not very common in Ireland, but some have a preference for it. It is useful where one has a good parlour in a good location, but is restricted from extending backwards or forwards.

Whether to choose a 2'6" or a side-by-side depends on a lot of factors. Milking machine manufacturers generally have a preference for one type or the other and tend to put pressure on to choose whichever type they prefer. Although, in the end, most will be happy to fit whatever type you want. If you have a suitable existing parlour or other shed in good condition, then its width can determine whether it is a 2'6" or the side-by-side. Farmers who are happy with the level of service support they are getting want to be loyal to their milking machine agent. After sales service is very important and is often the deciding factor. This is even more important when the machine chosen has a lot of automation and computerised systems. A state of the art machine and poor after sales service is a bad combination.

Making a decision on which parlour type to choose is not easy. The advice used to be: go and see parlours, then it used to be to go and see them at milking time, but now, especially to farmers trying to make up their minds on which type of parlour, the advice is to go and actually milk in the different types. I know one farmer who got the Farm Relief Service to milk his cows while he checked out and milked in some of the newer designs; he is very happy now he did.

Parlour drawings

Teagasc has a bank of standard drawings of all types of farm buildings available through your Teagasc adviser. Over 150 of those drawings are of various types of parlours. These are detailed drawings that you can use to plan your parlour.

I have included some of these drawings in the paper as follows:

Drawing 1 is a standard 6-unit herringbone at 915mm (3ft.) centres.

Drawing 2 shows a sample floor plan of a 12 unit 2' 6" (with room for 14 units).

Drawing 3 shows a section of the 2' 6" parlour with two roof options. The "A" roof is more often built nowadays with a roof pitch of 15^0.

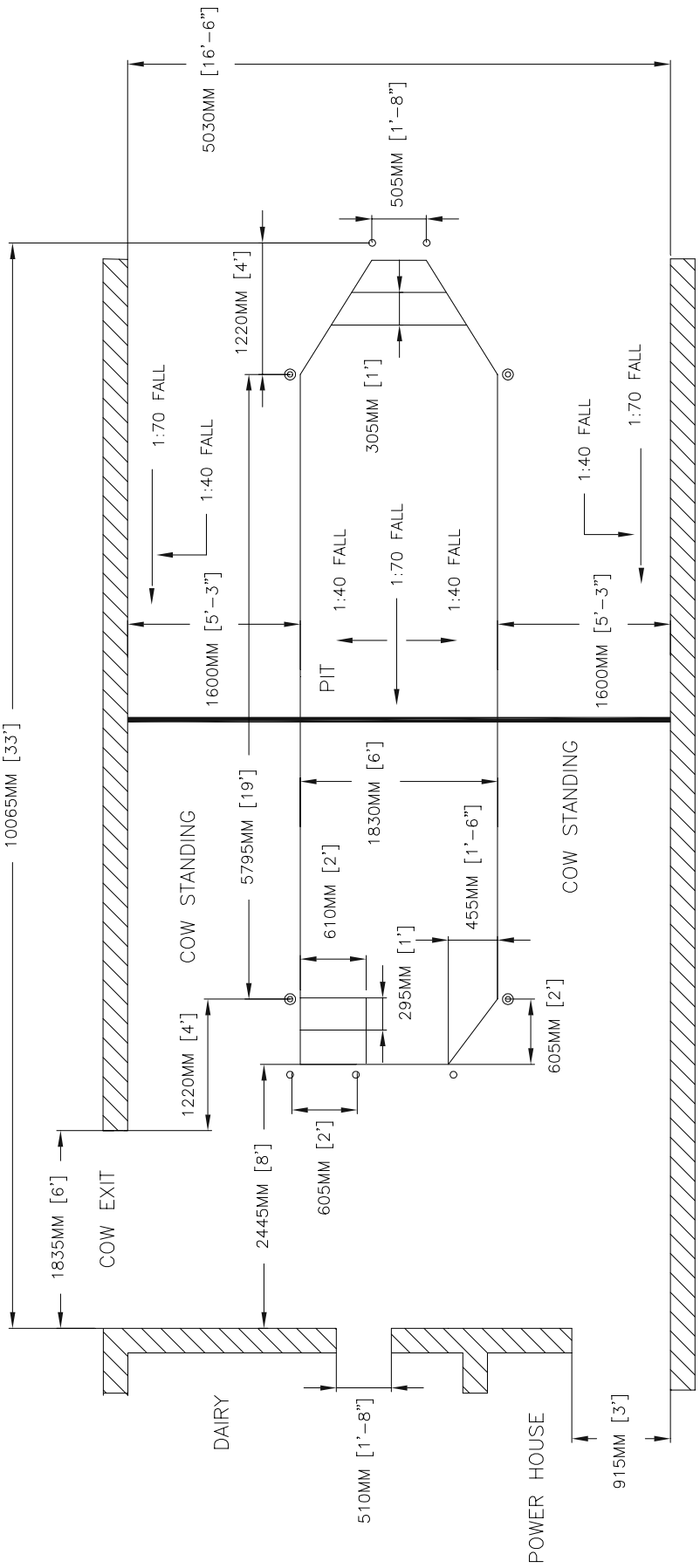
Drawing 4 shows a sample floor plan of a 20 unit side-by-side parlour.

Drawings 5, 6 and 7 show a plan, section, end views and elevations of an existing side by side parlour. Parlour, dairy, drafting area, crush, collecting yard and backing gate are shown.

Drawing 8 is of the parlour in Teagasc, Clonakilty, showing the drafting unit.

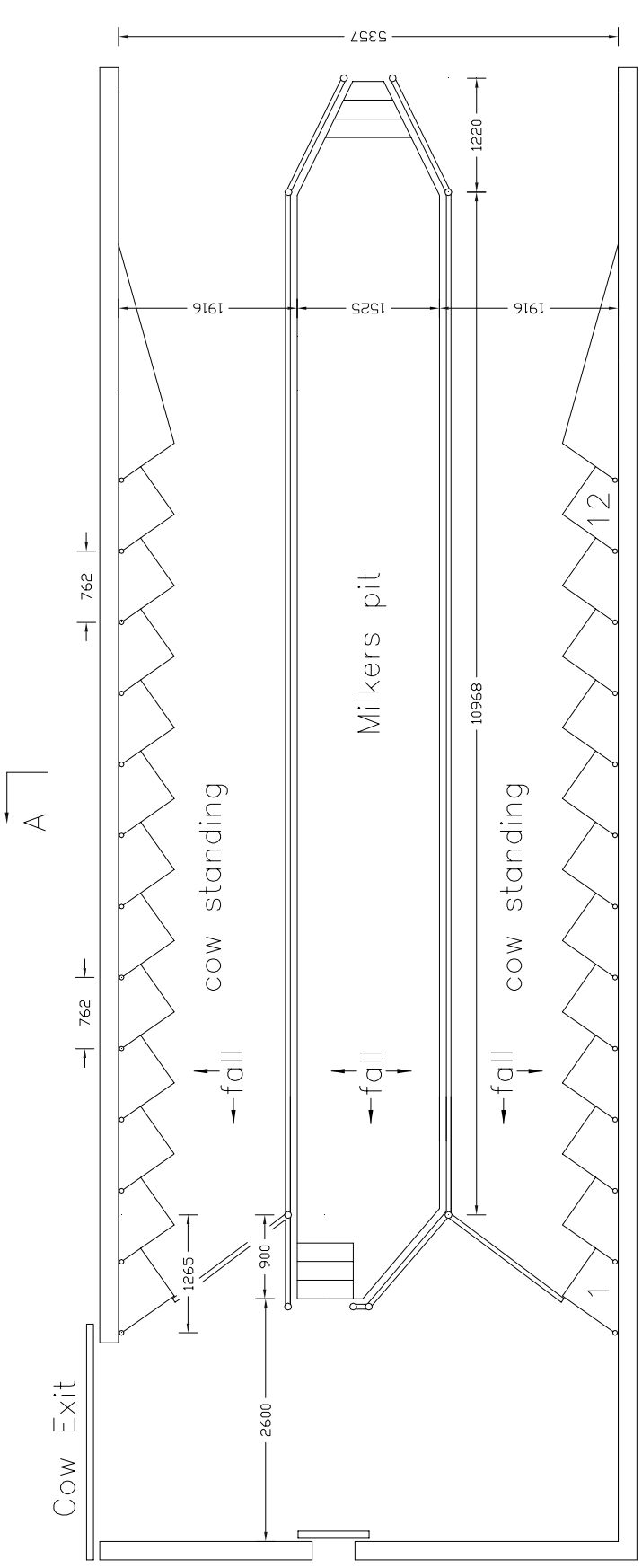
Drawings 1 to 4 reasonably detailed, however, consult your milking machine supplier/manufacturers and involve your building contractor in timely consultations to avoid delays and costly mistakes.

(Refer to next page)



Drawing 1

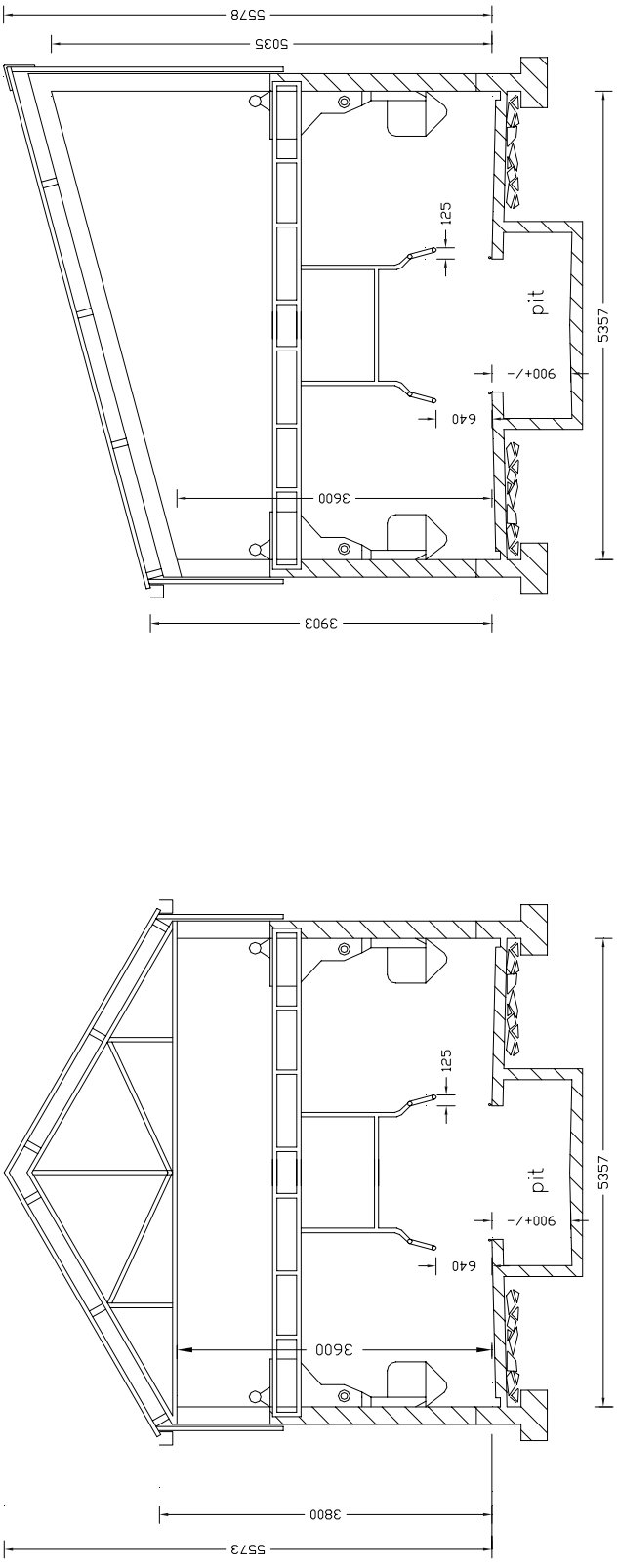
6 Unit steel troughs 915MM [3'-0"] Centres



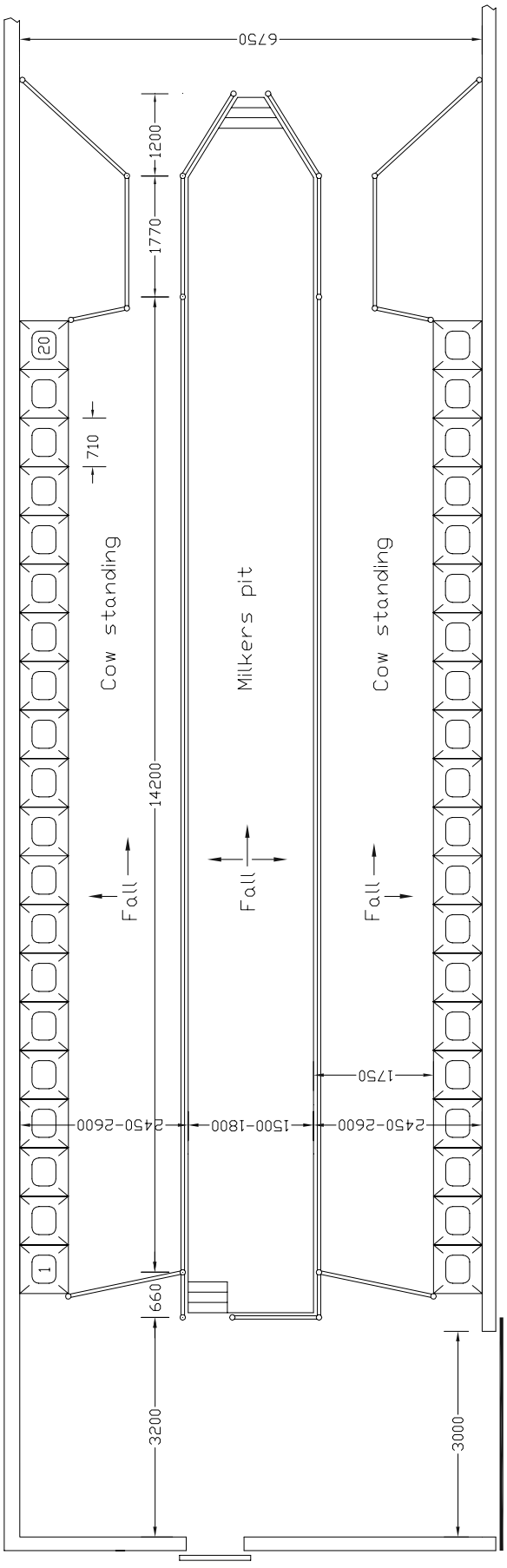
Drawing 2

12 unit 2' 6" Room for 14 units

Plan View

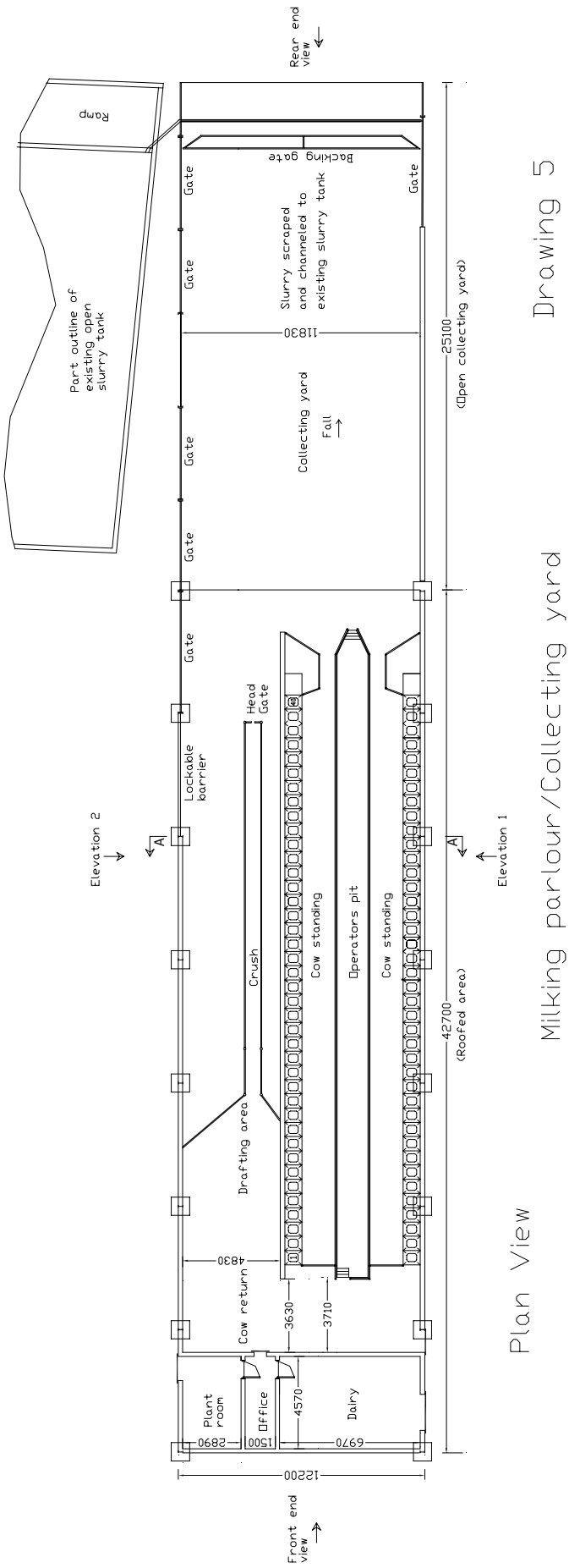


Drawing 3 Section AA of a 2' 6"

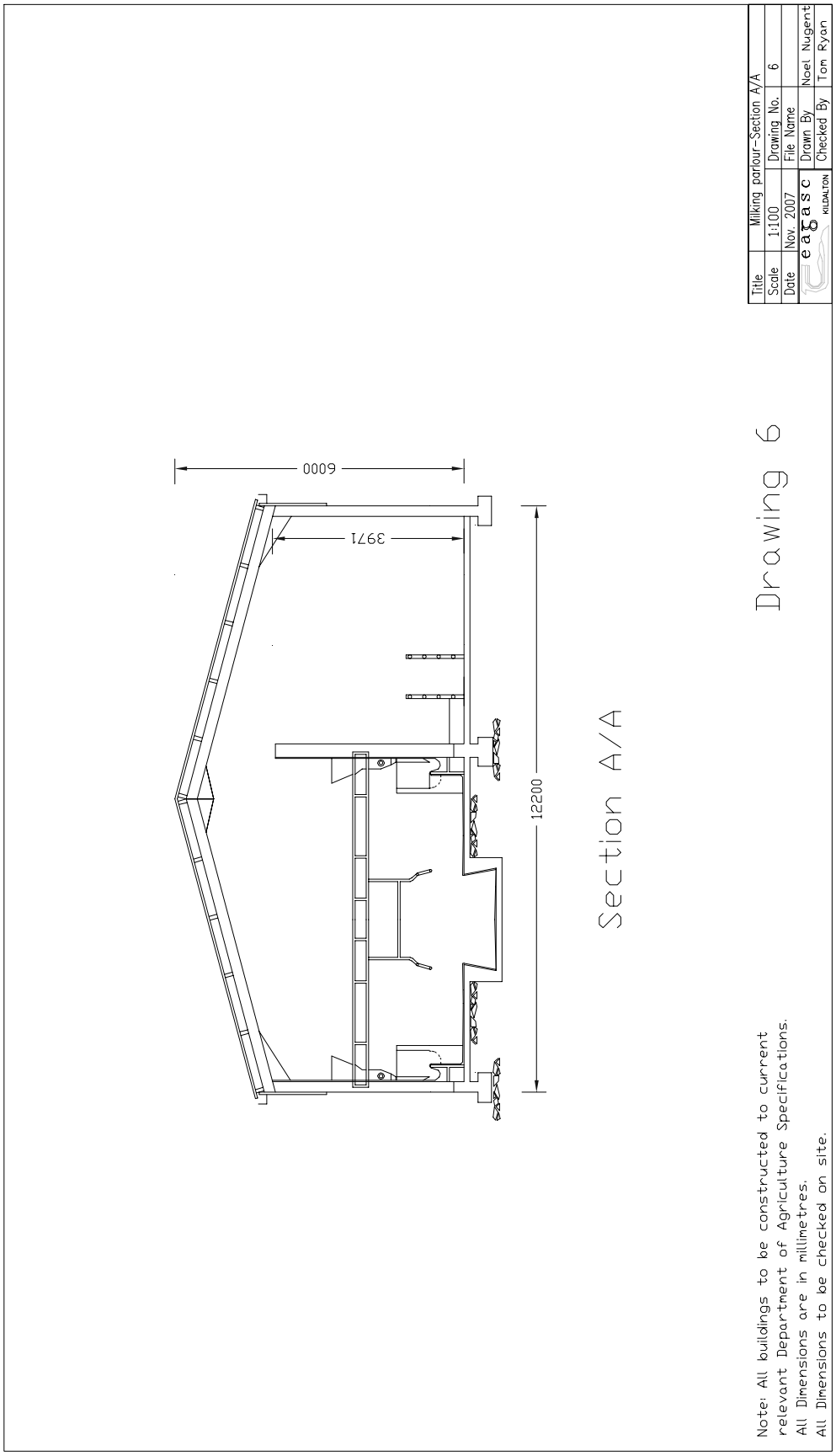


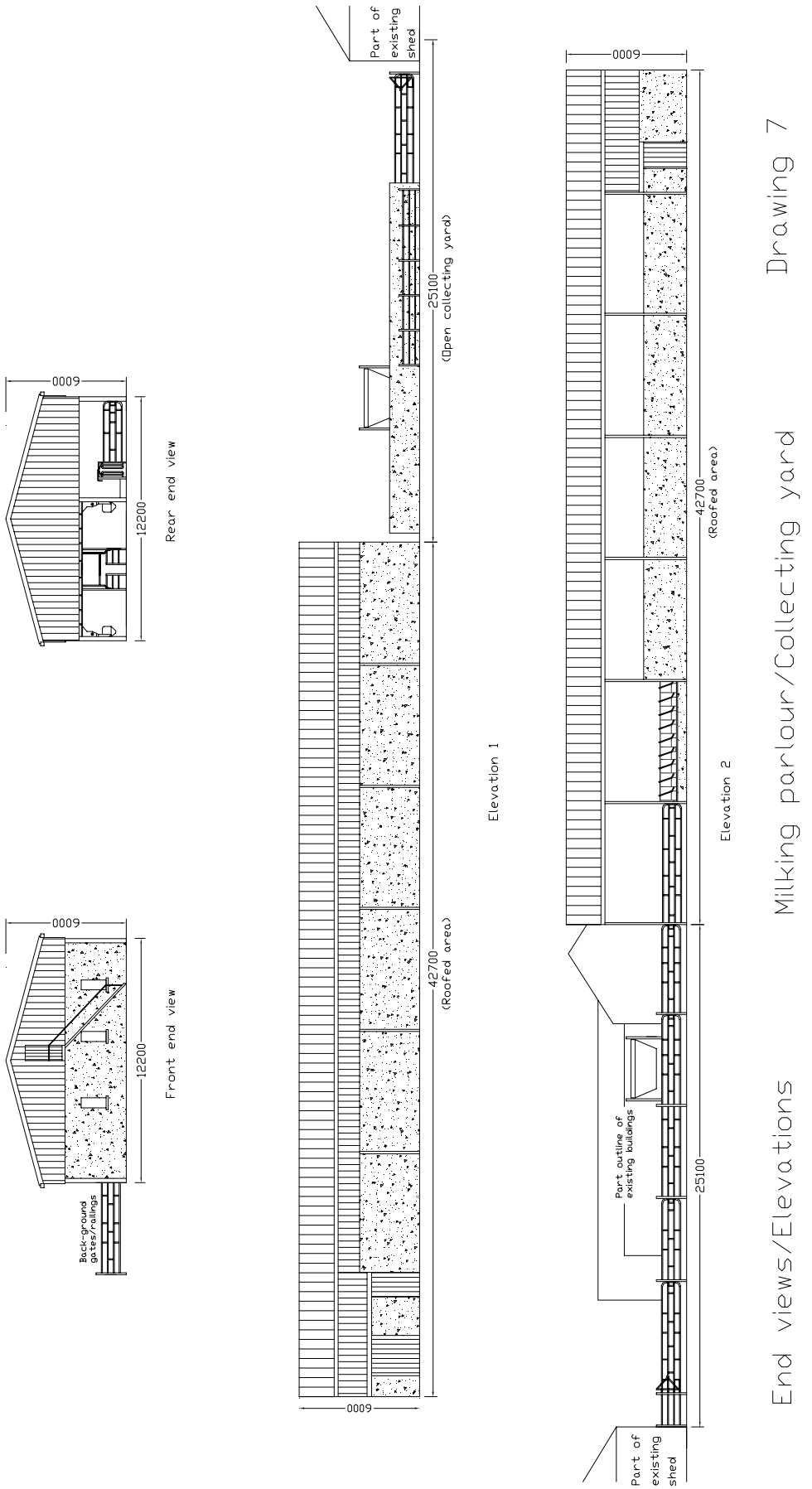
Plan View

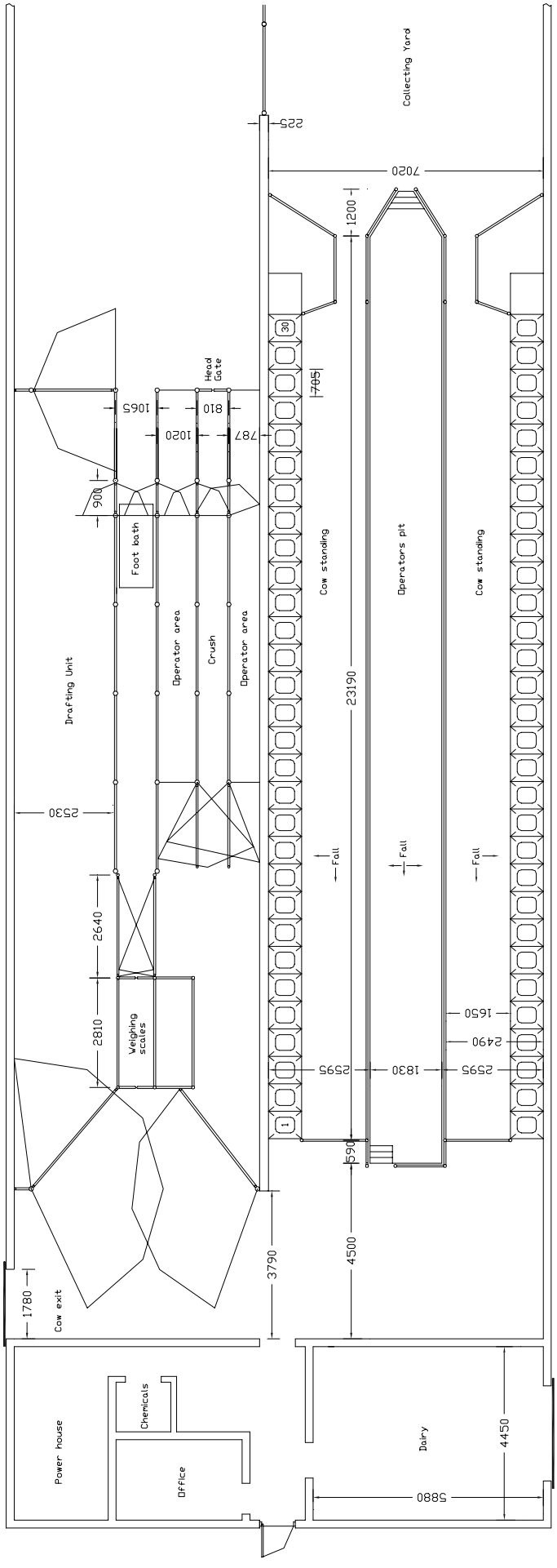
Drawing 4. 20 unit side-by-side parlour with sequential bailing and auto identification



Plan View Milking parlour/Collecting yard Drawing 5


6000
3971
12200
Section A/A
Drawing 6
Note: All buildings to be constructed to current relevant Department of Agriculture Specifications.
All Dimensions are in millimetres.
All Dimensions to be checked on site.
Title
Milking parlour-Section A/A
Scale
1:100
Drawing No.
6
Date
Nov. 2007
File Name
Drawn By
Noel Nugent
Checked By
Tom Ryan
teagasc
KILDALTON


Drawing 7
Milking parlour/Collecting yard
End views/Elevations
Rear end view
Front end view
Elevation 1
Elevation 2
6000
12200
25100
42700
(Roofed area)
(Open collecting yard)
Part of existing shed
Part outline of existing buildings
Back-ground gates/railings



Plan View Drawing 8 Clonakilty milking parlour

Output of milking parlours

In an ideal situation the milker can carry out the complete milking without leaving the pit. The following factors influence the output of a milking parlour:

- Cow drafting
- Parlour design
- Location of parlour
- Skill of the operator
- Holding yard design
- Milk yield and milking routine
- Design of milking equipment
- Location of udder wash hoses, teat spray jets, and power hose for occasional washing of cow standings

Parlour throughput is very important. More units, good design, labour saving devices, labour efficient and safe handling facilities will all pay ongoing dividends

Parlour throughput hinges around the number of units, good work routine, general design and layout of the parlour and collecting yard, backing gate, no obstructions entering and leaving the parlour, entrance and exit gates that can be opened from anywhere in the pit, good light, no stress causing factors, etc.

Labour efficiency is closely linked to parlour throughput. Labour efficiency can be maximised by planning it into the overall design. Gates and penning well planned, drafting and handling facilities well laid out, slip-throughs for people, feeders, cluster removers, automatic gates at entrance and exit, swing arms, diversion line, autowasher, wash down system, etc., are all elements to improve labour efficiency and reduce drudgery

Safety is important also. Facilities should be planned and built so that one person can operate it and handle animals in safety. Safety for the user is most important but the importance of safety during construction and subsequent maintenance is important also.

The aim at the end of the day is to have a milking parlour that will milk the cows efficiently, both from the point of view of the milking machine and the building.

Milking routine

Production levels, design of the milking units, and work routine time (WRT) together decide the eventual performance of a parlour. The work routine time is the time taken to carry out all operations at a milking unit. The work routine practiced on a particular farm is the most important factor in determining the number of cows a milker can milk

in an hour. The performance (P) of a parlour in terms of cows milked per man hour may be stated as P = 60/WRT (minutes). A typical work routine time is given in Table 2.

Table 2 shows a breakdown, in seconds per cow, of the various tasks in a typical milking routine. The times were recorded in the Moorepark labour survey.

The breakdown is as follows: 3.4 seconds entry time; 8 seconds for pre-spray and paper dry (estimate); 10.1 seconds for cluster attachment, cluster detachment is by automatic cluster removers; 3.9 seconds for washing the cow standings; 5 seconds for miscellaneous; 1.9 seconds for teat dipping; and 1.9 seconds for exit time. This is a total of 34.2 seconds, making it possible for one person to milk 105 cows in one hour (P = 60/0.57), assuming that the number of units is not the limiting factor. If we omit the pre-spray and paper dry the WRT is 26.2 seconds (0.4366 minutes), making it theoretically possible for one milker to milk 137 cows in an hour.

Table 2. Time for different elements of milking routines

Milking routine	**Seconds/cow**
Cow entry	3.4
Pre-spray and paper dry (estimate)	8.0
Attaching clusters	10.1
Disinfecting teats	1.9
Cow exit	1.9
Washing cow standings	3.9
Miscellaneous	5.0
Work routine time (WRT)	34.2 (0.57 minutes)
Output (cows per man hour)	**105**

More units

Adding more units to your parlour has the biggest effect on increasing parlour throughput. Table 3 shows the throughput possible with different numbers of units and changeover intervals for 70 cows for swing-over type parlours. The table shows the two extremes in terms of throughput, taking from 35 minutes to milk the 70 cows with a 14-unit and seven minute changeover interval and 87 minutes with an 8 unit and 10 minute changeover interval. The table should cater for most scenarios but there are situations where the changeover interval can be less than seven minutes and up to 12 minutes.

Table 3 also shows the effect different numbers of units have on milking time for a particular changeover interval. For example, with a changeover interval of eight

minutes per row it takes 40 minutes with a 14-unit and 70 minutes with an 8-unit to milk 70 cows.

Of course, for your own parlour, you know the milking time and the number of rows of cows and can calculate or time the changeover interval. You can modify the table to suit your own circumstances and herd size. The number of rows of cows is determined by the number of units and cows to be milked. In the table the milking time is calculated by multiplying the number of rows by the changeover interval. The time in seconds available to devote to each cow is derived by dividing the changeover interval (in seconds) by the number of units. The time available to devote to each cow is different to the WRT.

The time available to devote to each cow in, in this scenario, varies from 30 seconds per cow to 75 seconds per cow. In practice, the number of tasks in the milking routine and the time taken to do each makes up the time needed to devote to each cow. In many situations, where the milker is not fully occupied, part of the time will be spent waiting for the cows to milk. If the milker has too many units to manage, the cows will be waiting for the milker.

Table 3. Effect of different numbers of units and changeover intervals on total milking time and work routine time for 70 cows

No. units	Changeover Interval (minutes)								No. of rows of cows
	7		8		9		10		
	Time/ cow (secs)	Milking time (mins)	Time/ cow (secs)	Milking time (mins)	Time/ cow (secs)	Milking time (mins)	Time/ cow (secs)	Milking time (mins)	
14	30	35	34	40	38	45	43	50	**5**
12	35	41	40	46	45	52	50	58	**5.8**
10	42	49	48	56	54	63	60	70	**7**
8	52	61	60	70	67	79	75	87	**8.75**

Collecting yard

Rectangular holding yards are generally used in integrated dairy units. The holding yard and entrance to the parlour should allow a free flow of cows into the parlour. Narrow doors at the entrance to the parlour restrict cow flow and limit throughput. If a large throughput is required a motorised backing gate is a basic requirement, this should be operated from any position in the milkers pit. Slotted channels should be installed in the holding yard and at the front of the cow standings, these channels can make significant reductions in the time taken for yard washing.

Drafting and handling facilities

In a large parlour the installation of an automatic cow drafting system allows the operator to remain in the pit during milking. Commercial automatic drafting systems are available. The cows are identified using either ear tag, neckband or tail type

transponders from an antenna in the drafting stall and can then be drafted into a number of holding pens. Automatic drafting systems can be justified in large parlours. Manual cow drafting systems can also be used. A mechanical arm from the front of the pit usually operates the drafting gate on the exit race. A manual or automatic drafting system is required to achieve an output of at least 100 cows per man per hour. More emphasis should be placed on the design of the entrance to and exit from parlours, especially for larger parlours. More information is available in the Teagasc booklet “Cow Collecting Yards and Drafting Facilities”.

Department specifications

The most important specification for milking parlours and dairies is S106. Other relevant specifications are: S100 (concrete); S101 (roofs); S102 (cladding); and S129 (drainage), etc.

S106 is mainly concerned with the construction of the parlour, dairy and plant room and it is necessary to follow it to comply with grant requirements. Very often mistakes are made that would have been avoided if S106 was followed. There are 19 sections in S106 covering all aspects of the construction.

Design and build milking facilities to suit the day-to-day use of the facilities by the end user, as opposed to allowing short cuts or other convenient modifications to be made by your building contractor and milking machine installer, or others during construction and installation.

Milking parlour floors

Getting the floor right is very important. A milking parlour floor must be constructed properly if it is to perform well over time. A good floor must have a durable non-slip surface that is easy to clean. The floor must be at the correct height in relation to the surrounding yard, existing buildings, the milker’s pit, existing or proposed tanks and eave height. The gradients must be adequate to provide effective drainage and the floor must have steel mesh to act as protection against the possibility of stray voltage.

Where a new parlour is being built every effort should be made to get the floor exactly right. This is more difficult in some situations than others because of the slopes of the site and its location in relation to existing buildings. Where an existing parlour is being upgraded or extended, the depth of the pit, the direction of the falls in the cow standings and the elimination of steps or steep ramps are all factors to be considered.

Surface durability

The foundation for the floor should be formed with 150mm of blinded and well compacted hardcore. Lay this to the falls required in the finished floor. Use concrete with a minimum strength of 35N/mm^2 and a cement content of 300kg/m^3 and lay it to a depth of 100-125mm. Using concrete with a strength of 40N/mm^2 and 350kg/m^3 of cement would give a more durable surface. It should be considered especially if a dry shake-on powder is not being used. More care is needed with 40 Newton concrete because it is more inclined to crack and will go off more quickly. A wooden or plastic float finish will give a surface that is non-slip and easy to clean.

Curing is just as important as cement content when it comes to durability of concrete floors. This is especially true in milking parlours because a drying wind often tends to blow through them. If the water in the concrete dries out before it has a chance to react with the cement in the concrete, the concrete surface will be weak and significantly less durable. In severe drying conditions shrinkage cracks will be formed also. The simplest method of curing concrete is to cover it for about a week with a new sheet of polythene. Hold it in place with a shake of sand to prevent air blowing under it.

Dry shake-on powders

Incorporating a coloured, shake-on powder onto the top 5mm of the wet concrete will enhance the wearing surface of the floor. This can increase the abrasion resistance eightfold compared to 40 Newton concrete, while providing a bright, slip resistant surface for the cows to walk on. The powder is available in five colours, natural, tile red, mild grey, dark grey and mild green. The concrete is placed and levelled in the normal way. When any bleed water has evaporated, a 25kg bag of the dry powder is sprinkled by hand over an area of 10m^2 and left to soak up the water from the concrete. After about ten minutes the material should be rubbed with a wooden or plastic float before applying a second bag of powder to the same area. The final finish can be achieved by rubbing with a wooden or plastic float, giving a non-slip, easy to clean texture to the surface of the floor. Curing is essential. The manufacturer's instructions should be followed. The shake-on topping costs about €7 per square metre.

Correct slopes

Getting the falls right in and around a parlour is not easy. One of the main aims is to provide effective drainage. Good drainage means that wash water will flow freely to channels and pipes without you having to chase it all over the yard and without leaving any lodged water on the surface.

Other aims are to avoid having to use steps or steep ramps and to position the height

or level of the parlour and associated yards correctly in relation to cow access routes to and from buildings and roadways. Don't be tempted to base the levels for the parlour at the most suitable level for the dairy floor. If necessary, well-designed steps can provide safe and easy access to and from the dairy.

Slope of the cow standing

The cow standing should fall in the same direction and ideally have the same slope as the milkline. This is usually towards the front of the pit. In this way the same height of milk lift is maintained for each milking unit. The height of milk lift (measured from the cow standing to the highest point of entry to the milkline, recording jar or milk meter) must not exceed 2.1 metres and should preferably be not more than 1.7 metres. If the milkline and the cow standing are sloping in opposite directions in long parlours the milk lift of the units at the back can be excessive.

The slope in the cow standing from parlour entrance to exit should be about 1: 60 to 1:80. In parlours up to about eight units, a slope in the standing to the back of the pit (from exit to entrance) should not pose a problem. Some milking machine manufacturers install the cow standing level and this should work fine up to about 16 units. At least both slopes aren't moving away from each other. In some situations the receiver jar may have to be located at the back of the pit to get the falls right. The milk is then pumped from there to the dairy.

Pit slope and depth

The slope along the pit should be the same as the slope in the cow standings. The slope from the edge of the pit to the sidewall of the parlour should be 1:40 leading to an open channel (Diagram 1), a split drain (Diagram 2), or no channel at all. Where straight concrete troughs are used in side-by-side parlours good drainage is achieved with a split drain with its opening located just at the face of the trough just in front of the cows' front feet. If metal troughs are used then the split drain should be beside the wall.

In the pit a 1:40 slope from the centre towards the cow helps to reduce unnecessary bending of your back when attaching clusters. The ideal pit depth varies from person to person. Obviously, it's much easier to reduce the depth than deepen it. The correct depth is the depth that allows you to stand straight while attaching clusters. The correct depth is in the region of 800-900mm (32-36") for most people. The deepest pit I have seen is 1040mm (41"). Allow for the thickness of some sort of shock absorbing human mat on the floor.

Pit drainage

Where the pit cannot be drained by gravity into the soiled water tank it should be piped by gravity from the pit into a sump located in a suitable safe place outside the parlour. It can be pumped from this sump to the soiled water tank with a small float-switch controlled submersible pump.

Bonding grid

To eliminate the possible effects of stray voltage a metal equipotential grid must be located in the parlour floor. The floor is a conducting surface and the metal grid allows it to be bonded to the rest of the equipment in the parlour.

In new parlours A142 steel reinforcing mesh (200mm x 200mm) should be laid in the floor within 40-50mm of the surface (Diagram 1). The mesh should be laid in the cow standings, in front of and behind the pit and on the floor of the pit. Extend the mesh as far as possible into the yard to eliminate possible shocks as the cows move into the parlour. The mesh should be turned down into the ground at 45^0 in the shape of a ramp for about 1.8m at its extremities near the entrance and exit of the parlour.
All sheets of mesh must be overlapped and welded together at several points and

ideally welded to all uprights and pipes fixed into the floor. In this way, all metalwork in the parlour and dairy, including the milking machine, is connected electrically to the mesh in the floor. Thus, all surfaces in and around the parlour and dairy won't have any voltage difference between them.

The mesh will also lessen or eliminate the need for contraction joints in the floor.
In an existing parlour, the mesh may be located in either a new floor or, where suitable, a screed on the existing floor. Another alternative is to lay copper bonding conductors in slots cut in the floor and grouted. This method is costly and should only be considered if the floor is in good condition.

Costs/grants

Many farmers did not have their plans ready in time to avail of the Farm Improvement Scheme (FIS) by the time it was suspended. Farmers intending to do some grant aided work in the FIS should straight away set about planning and getting planning permission for what they want to do. The important thing is to be ready to lodge the application when/if the FIS reopens.

Also, set about getting quotations and preparing cost estimates. It is vitally important to know what costs you are letting yourself in for when you go about building a new parlour or extending/renovating an existing one. Remember that a distinction was made in the FIS between "upgrading" and "extending" a milking machine. You will not get a grant for an upgrade of an existing machine. You will get a grant for the

extended units in an existing milking machine (@ 40% of €3,500 per unit, for each unit up to the ceiling of €40,000). A new machine is grant aided up to the same ceiling. Read carefully the list of grant aided items in the "Terms and Conditions" of FIS.

Milking parlour costs should be divided into the costs associated with the building of the parlour/dairy and the milking machine. Build a milking parlour that will best suit your needs and financial situation. Allow for future expansion and the possibility of adding more automation. See Table 4 for the FIS standard costs for milking facilities.

Building costs

To build a 14-unit milking parlour, dairy, plant room, unroofed collecting yard with slatted tank and unroofed drafting area with a small crush costs about €5,270 per unit. An 18-unit parlour, to the same specification, would cost about €4,700 per unit. This would amount to a total of €73,780 and €84,600, respectively. These prices are before the grant and VAT. This cost per unit could rise to between €7,000 and €8,500 per unit where collecting yards and drafting facilities are roofed and the level and the list of items for fitting out is high.

Machine costs

Milking machine quotations generally show a list of items costed for the number of units and the level of equipment required. Another useful way to get a handle on these costs is to break them down per unit. Again the range of costs can vary widely depending on the specification. The costs range for about €1,700 to €8,500 per unit. €1,700 per unit would be a very basic machine, without feeders and possibly with some second hand parts. €8,500 per unit would supply a 'state-of-the-art' machine with swing arms, automatic front and rear gates, diversion line, automatic cluster removers (ACRs), electronic milk meters, electronic feeders, auto identification, auto washer, electronic drafting, etc. A more middle of the road price range of €3,500 to €5,000 per unit would include modern meal feeders and a reasonable level of automation, such as swing arms, ACRs, diversion line and front and rear automatic gates. Discuss the various options with your agent before you get a written quotation. Manufacturers often have a range of options for various components. If you are comparing one quotation with another, try to compare like with like.

The cost of some other items of equipment to consider are: a bulk milk tank, milk filter, plate cooler, water heater(s) or heating system, wash troughs, hand washing facilities, wash down system, backing gate, generator (or alternative), air compressor.

Table 4 is an excerpt from the FIS Standard Costings of the Department of Agriculture, Fisheries and Food relating to dairies, milking premises, etc., constructed according to S106.

Table 4. FIS Standard costings, S106 Dairy, milking premises etc. (excerpt)

Dairy		€400.00
Milking premises		€287.00
Plant room		€166.00
Simple store/office		€166.00
WC and WHB including compartment, septic tank and drains (to local authority standards)		€5,273.00
Gravelled yard for milk dispatch areas (limit 300m²) with drainage layer		€5.00
150mm concrete dairy apron	m²	€26.00
Power washer		€1,395.00
Submersible pump	m²	€200.00
Bulk tank	m²	€5.10
Milk silo	m²	€2.00
Plate cooler	m²	€1,000.00
Ice builders	Item	€170.00
Milking machine	m²	€3,500.00
Robotic milking machine	(limited by scheme ceiling)	€40,000
Meal feeding system in milking parlour	per cow place	€550.00
Auto-washer for milking machine item	item	€2,250.00
Condensing Unit (Compressor) for bulk milk tank		€3,400.00
Water heater	litre	€5.00
Backing gate		€10,000
Draughting facilities	item	€8,000
Electronic/computer controlled calf feeding systems	item	Vouched Receipts

Meal Bins

<7 tonnes	per tonne	€348.00
7 to 9.99 tonnes	per tonne	€288.00
10 to 12.99 tonnes	per tonne	€241.00
13 to 15.99 tonnes	per tonne	€207.00
16 to 19.99 tonnes	per tonne	€203.00
>20 per tonnes	per tonne	€159.00
Augers	item	€2,500.00
Concrete base, 250mm thick	per m²	€34.00

Summary

Building a new milking parlour is a costly investment with a planned useful life span of up to 40 years. Modern milking parlours are complex and labour intensive to construct. Good liaison and cooperation is vital between the farmer and all the various contractors, suppliers and trades involved. Attention to detail is vital. A quality durable finish is the desired outcome. Built with the end users in mind (the milker and the cows) it will prove a valuable resource and a worthwhile investment. Modern milking machines are designed to milk cows efficiently and the parlour should also be designed with labour efficiency, good throughput and safety in mind.

WORKING WITH YOUR BUILDING CONTRACTOR – GETTING IT RIGHT ON SITE

Bill McEvoy, Chairman, Irish Farm Building Contractors Association

As chairman of the Irish Farm Building Contractors Association I welcome the opportunity to address this conference today. I have been involved in the farm building business for over forty years. In that period I have seen many changes in design, specifications and standards generally.

Farm building history

From the mid-seventies, when farming began to get more intensive and farmers started to move away from the haybarn and lean-to to slatted accommodation, there has been regular upgrading of specifications with higher standards of workmanship and better quality materials being sought with each up grade.

Over the years there has been a number of boom periods followed by slack periods largely dictated by the state of the farming economy and also the level of grant-aid available, but never before were farmers obliged by law to provide housing and slurry accommodation for all their animals for a sixteen/twenty-two-week period, depending on location.

Farm Waste Management Scheme

The introduction of the Farm Waste Management Scheme, with the region of 60% grant-aid, has prompted 48,000 farmers to seek to upgrade their facilities under the scheme. To date, in the region of 38,000 approvals have been issued with approximately 13,500 grant-aided jobs completed and paid out.

With a deadline of December 2008 to complete all work under the Scheme the whole industry, contractors/suppliers etc are facing an onerous task.

With the slow down in house building and other lines of building work, as expected a number of contractors have returned to farm building. Together with a number of new contractors who have got involved we can expect that a greater number of jobs will be completed than was envisaged 12 months ago. Nevertheless there is no hope of completing all of the work by 31 December 2008.

To ensure the best possible use is made of everyone's time, it is important that when a contractor is invited to tender that he is furnished with a full set of drawings i.e., farmyard layout, plans and elevations of the proposed work. While there has been a big improvement in the standard of drawings, not all plans/drawings are to a standard to enable the contractor to submit an accurate quotation. It is in everyone's best

interest that the contractor visits the site to observe the situation for himself and to discuss the farmers needs with particular regard to types of roof, neckrails, doors, gates, drinkers etc, all of which have a variety of options which could affect the final price.

The quotation when submitted to the farmer should accurately include details of the work to be carried out and if part of the works i.e., electrical, excavation, backfilling is not covered by the quote this should be highlighted for the farmer's attention. The price should state whether VAT is included or not as shown in following sample.

John Builder and Sons

Telephone: 057-1111111 **River View**
VAT Number: 1111111R **Portlaoise, Co. Laois**

QUOTATION

Mr. Joe Farmer
Mountain View
Portlaoise
Co. Laois
26 March 2007

Dear Joe,

We thank you for your enquiry and have pleasure in quoting you for same, including:-

To mark out and keep levels while excavation is in progress
To build tank 37.8m long x 11.75m wide x 2.4m deep
To fit 3 runs of tractor slats 16m x 3.8m including 3 no. safety manholes
To fit 3 runs of heavy duty slabs 21.8m x 3.8m including 3 no. safety manholes
To erect roof 40.38m long x 17.224m wide x 3.9 high
Fibre cement sheeting on timber purlins on hot dipped galvanized framework
To fit ventair sheeting 1.8m on 8 Bays
To build external walls 56m x 2.1m mass concrete
To lay feeding passage 36.78m x 6m x 125mm
To lay cubicle passages 1 no. 36.78m x 4m and 1 no. 36.78m x 2.7m
To lay 2 No. scraper ram pads 2.7m x 1.5m each
To fit 85 No. cantilever cubicles including cubicle step, neckbar etc
To build wall at end of cubicle rows 13.8m x 1.5min total
To fit 2 No. sliding doors in north gable, opposite cow passages
To fit 9 No. cranked slanted bar neckrails 40.5m in total
To fit 2 No. 4m, 2 no. 2.7m 2 no. 3.5m gates
To fit 3 No. water tanks 1 in holding yard and 2 in cubicle house

Price €000,000 Plus VAT @ 13.5%

Prices do not include electrical work, excavation, drawing away, backfilling of tanks, the removal of rock or water or any filling that might be required. Enclosed please find copy of current C2 cert and proof of EL & PL insurance. We trust this will be to your satisfaction, however, if you do have any further queries please do not hesitate to contact us.

Thanking You
John Builder

It is advisable to include a copy of the contractors EL & PL insurance cover and a copy of his C2 with the quotation to enable the farmer to compare fully like for like before making a decision.

Irish Farm Building Contractors Association current EL & PL rates

Employers Liability

Clerical	.35%
Farm Building Work	2.76%
Other Building Work	2.76%
Steel Erection	7.8%

Public Liability

0.2% of Turnover.

Excess

€2,750.00

When a decision is made and the job awarded then contracts should be drawn up outlining exactly the work to be done, the method of payment etc. Conditions of Contract drawn up for our members in 1989 which are equally accommodating to both the farmers and the contractor should accompany the other details, be signed with a copy held by both partners.

Extra work over and above what is contained in the contract may emerge as the job progresses. To avoid any differences of opinion at the end the nature and cost of this work should be agreed before any extra work commences.

The following is a sample contract:

John Builder and Sons

Telephone: 057-1111111
VAT Number: 1111111R

River View
Portlaoise
Co. Laois

CONTRACT

SUBJECT TO CONTRACT TERMS AND CONDITIONS

Mr. Joe Farmer
Mountain View
Portlaoise
Co. Laois
26 March 07

To mark out and keep levels while excavation is in progress
To build tank 37.8m long x 11.75m wide x 2.4m deep

To fit 3 runs of Tractor slats 16m x 3.8m including 3 no. safety manholes
To fit 3 runs of heavy duty slabs 21.8m x 3.8m including 3 no. safety manholes
To erect roof 40.38m long x 17.224m wide x 3.9 high
Fibre cement sheeting on timber purlins on hot dipped galvanized framework
To fit Ventair sheeting 1.8m on 8 Bays
To build external walls 56m x 2.1m mass concrete
To lay feeding passage 36.78m x 6m x 125mm
To lay cubicle passages 1 no. 36.78m x 4m and 1 no. 36.78m x 2.7m
To lay 2 no. scraper ram pads 2.7m x 1.5m each
To fit 85 no cantilever cubicles incl. cubicle step, neckbar etc.
To build wall at end of cubicle rows 13.8m x 1.5min total
To fit 2 No. Sliding Doors in North Gable, opposite cow passages
To fit 9 No. Cranked Slanted Bar Neckrails 40.5m in total
To fit 2 no. 4m, 2 no. 2.7m 2 no. 3.5m gates
To fit 3 no. water tanks 1 in holding yard and 2 in cubicle house

Price €000,000 Plus VAT @ 13.5%
METHOD OF PAYMENT
€00.00 when tank is built
€00.00 when slats are laid and framework of roof is erected
€00.00 when shed is roofed and external walls are built.
€00.00 when all work is complete.

_____ _____
John Builder Joe Farmer

For the last twelve months or so we have been encouraging our members to include a handout with the contract outlining the farmer's responsibility under Health & Safety Regulations. While one could argue that the whole Health & Safety legislation is geared towards the larger contracts nevertheless farmers, as clients, and contractors are bound to comply with the legislation. While I know that other speakers will cover this area in far more detail, I feel that for a start the farmer should appoint a Project Supervisor Design Stage and a Project Supervisor Construction Stage.

Given that the A.E.S. will no longer be making site visits as regular as heretofore the appointment of the PSDP and PSCS would ensure that planning and specifications are complied with.

This whole area is very much up in the air at present with farmers expecting contractors to act as PSCS. A contractor supervising himself is not the best arrangement. Neither is a farmer acting as PSCS if he chooses to do the building work himself an ideal arrangement. A meeting of the minds of all concerned in the coming weeks is very necessary to try and sort this one out. The alternative is to wait for some judge to apportion responsibility in the event of an accident at which stage some or all parties involved are exposed to the big hit.

The following are simple drafts of Contract/Agreement documents which could be used for this purpose:

Appointment of Project Supervisor Design Process (P.S.D.P) for Agricultural Construction Project

I (farmer's name) appoint (designer's name) as a designer and Project Supervisor for the Design Process (P.S.D.P.) in respect of the design of (brief description e.g. slatted shed,) at (address of the construction project)

From my experience of (designer's name) and from my enquiries made prior to his appointment, I am reasonably satisfied that (designer's name) has the competence to carry out his role in accordance with the 2006 Safety Health and Welfare at Work (Construction) Regulations. I am also reasonably satisfied that he will allocate sufficient resources to comply with his duties and prohibitions under the relevant safety and health legislation.

In accordance with Regulation 8(4) of the 2006 Safety Health and Welfare at Work (Construction) Regulations, I commit to co-operate with the P.S.D.P with regard to the time needed to design the project and with regard to the provision of any information available to me which might be required by the P.S.D.P.

I will also notify the Health and Safety Authority, Metropolitan Buildings, James Joyce Street, Dublin 1 by registered post of the appointments made to date with regard to this project. I also commit to supplying a copy of the preliminary Safety and Health Plan (as prepared by the P.S.D.P) to anyone being considered for or tendering for constructing the project.

Signed:
Farmer's Signature

Date: _____

Address:

I accept the appointment as outlined above.

Signed:

Designer's Signature

Date: _____

Address:

Appointment of Project Supervisor Construction Stage (P.S.C.S) for Agricultural Construction Project

I (farmer's name) appoint (P.S.C.S name) as Project Supervisor for the Construction Stage (P.S.C.S.) in respect of the construction of (brief description e.g. slatted shed,) at (address of the construction project)

From my experience of (P.S.C.S name) and from my enquiries made prior to his appointment, I am reasonably satisfied that (P.S.C.S name) has the competence to carry out his role in accordance with the 2006 Safety Health and Welfare at Work (Construction) Regulations. I am also reasonably satisfied that he will allocate sufficient resources to comply with his duties and prohibitions under the relevant safety and health legislation.

In accordance with Regulation 8(4) of the 2006 Safety Health and Welfare at Work (Construction) Regulations, I commit to co-operate with the P.S.C.S. with regard to the time needed to construct the project and with regard to the provision of any information available to me which might be required by the P.S.C.S.

Signed:
Farmer's Signature

Date:

Address:

I accept the appointment as outlined above

Signed:

P.S.D.S. Signature

Date:

Address:

Bill McEvoy – Powerpoint Presentation

AES COSTINGS

- Averaging between 46/52% approx. of actual 2008 costs.
- Next update due for 2008
- Costings applied will be those which are current on date of approval.

1

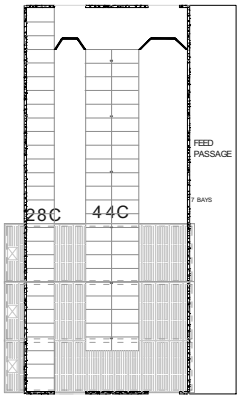
Building Guideline Costs March 2008

- The following are a few examples of what the more popular types of building are likely to cost.

These costs may vary from one area to another as market forces dictate.

2

House for 72 Cubicles, Scraped Passages



3

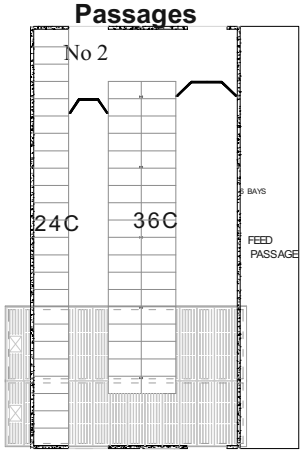
House for 72 Cubicles

- 72 Cubicles
- 7 bays
- 3 Rows
- Scrapers
- 16 weeks slurry storage, incl 200mm freeboard
- Triple Tank
- Cross area on outside option

- **€2,370 per cubicle**
- **Grant Aid €1,000 per cubicle**
- **Above max grant**
- **42%**

4

House for 60 Cubicles, Scraped Passages



5

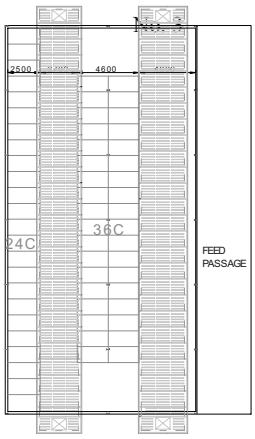
House for 60 Cubicles

- 60 Cubicles
- 6 bays
- 3 Rows
- Scrapers
- 16 weeks slurry storage, incl 200mm freeboard
- Double Tank
- Cross area on outside option

- **Cost €2,372 per Cubicle**
- **Grant Aid €1,200 per cubicle**
- **Above max. Grant aid**
- **50.5%**
- **56 Cubicle Spaces = Max Grant**

6

House for 60 Cubicles
Cows on Slats



7

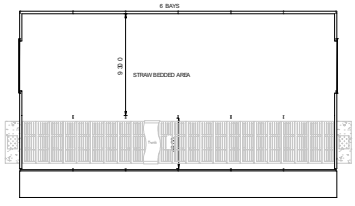
House for 60 Cubicles

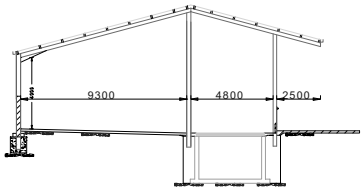
- 60 Cubicles
- 16 weeks slurry storage
- 6 bays
- Cows on Slats
- 2 Single Tanks

- **Cost €2,610 per Cubicle**
- **Grant Aid €1,200 per cubicle**
- **Above max. Grant aid**
- **45.9%**
- **54 cubicle Spaces = Max Grant**

8

Slatted/Bedded area for 91 cows





9

Slatted/Bedded Area for 91 cows

- Roofed
- 2.5m Canopy over feed area
- 16 weeks slurry storage
- 200mm freeboard
- 4.5 sq.m slatted plus bedded area per head

- **Cost €1,336per head**
- **Grant Aid €715 per head = 53%**
- **With farmyard manure store and seepage tank.**
- **Cost €1,566 per head**
- **Grant Aid €821 per head = 52%**

10

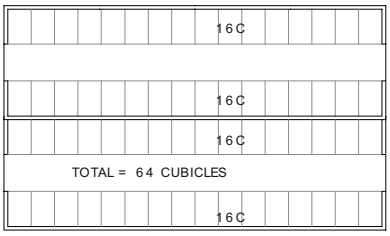
Slatted/Bedded Area for 91 cows - Roofed Bedded Area only

- Provide
- Roof on bedded area only
- 16 weeks slurry storage
- 300mm freeboard
- Rainfall midland counties
- 4.5 sq. m slatted plus bedded area per head

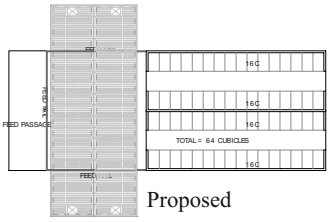
- Cost €1,220per head
- Grant Aid €636 per head = 52%
- With farmyard manure store and seepage tank Cost €1,450 per head.
- Grant Aid €742 per head = 51%

11

Existing Back to Back Cubicle House with 64 Cubicles



Existing



Proposed

12

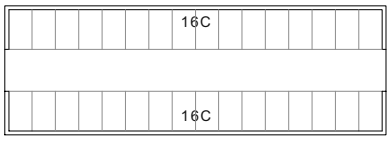
Existing back to back Cubicle House with 64 Cubicles

- Provide
- 16 weeks slurry storage
- 200mm freeboard
- Roofed easy feed system

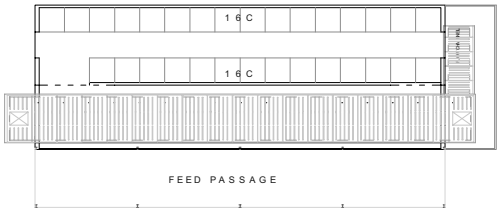
- With new scrapers Cost €1,326per cubicle
- Grant Aid €685 = 51.6%
- Without scrapers @ €1,220per cubicle
- Grant Aid €615 = 50.4%

13

Existing Shed with 32 cubicles



EXISTING CUBICLE SHED



PROPOSED SLATTED TANK & FEED PASSAGE

14

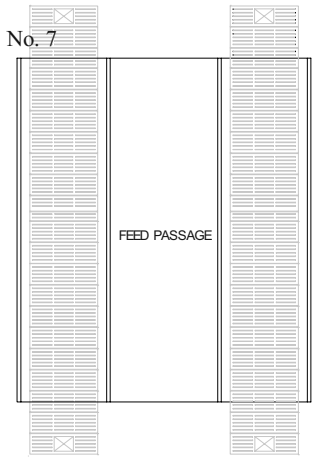
Existing 32 No. Cubicle Shed

- 16 Weeks Slurry Storage incl. 200mm Freeboard
- Roofed Slatted Area
- 2.5m Canopy over feed area

- **With new scrapers Cost €1,870 per Cubicle**
- **Grant Aid €1,122 = 60%**
- **Without Scrapers Cost €1,733 per Cubicle**
- **Grant Aid = 59%**

15

Slatted House for 100 Cattle



16

Slatted House for 100 Cattle

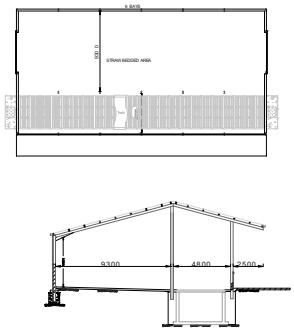
- 16 weeks slurry storage
- 200mm freeboard
- 2.25sq m. per head
- 2 Tanks

- Cost @ €1,300 per head
- Grant Aid €640 = 49.2%

112 Cattle on Slats = Max Grant

17

Slatted/Bedded Area 100 cattle



18

100 Cattle on Slats/Bedded Area Fully Roofed

- Provide
- Slatted bedded area for 100 cattle
- **Fully roofed**
- 2.5m Canopy over feed area
- 16 weeks slurry storage
- 200mm freeboard
- 4sq m. slatted plus bedded area per animal

- **Cost €1,209per head.**
- **Grant Aid €643 = 53%**
- **With farmyard manure store and seepage tanks €1,392per head.**
- **Grant Aid = 52%**

112 Cattle on Slats/ Bedded Area = Max. Grant

19

100 Cattle on Slats/Bedded Area Roof over bedded area only

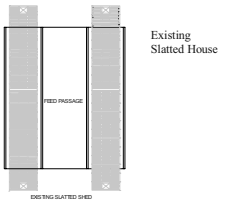
- Slatted bedded area for 100 cattle
- **Bedded area roofed**
- 16 weeks slurry storage
- **300mm freeboard**
- Rainfall midland counties
- 4sq m. slatted plus bedded area per animal

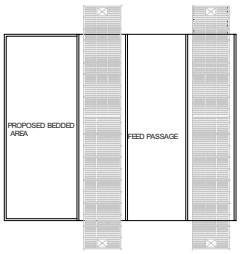
- **Cost €1,100per head.**
- **Grant Aid €578 = 52.6%**
- **With farmyard manure store and seepage tanks €1,290per head.**
- **Grant Aid €665 = 51.5%**

124 Cattle on Slats/Bedded Area = Max Grant

20

Bedded area to existing slatted area





Proposed Bedded Area

21

Bedded area to existing slatted area

- 4 sq.m. slatted plus bedded area per animal
- **Cost €486.00 per head**
- **Grant Aid €266 = 54.7%**

- With farmyard manure store and seepage tank
- **Cost €680per head**
- **Grant Aid € 355 = 52%**

22

Slatted area to existing bedded area

- Provide
- Roofed slatted area.
- 2.5m canopy over feed area
- 4 sq.m. slatted plus bedded area per animal
- **Cost €717 per head**
- **Grant €358 = 50%**

- With farmyard manure store and seepage tank
- **Cost €912 per head**
- **Grant Aid €447.70 = 49%**

23

Roofing Options

- Examples given are based on Spaced Metal Cladding
- Spaced Fibre Cement Painted 1.3% extra
- Lapped Metal Cladding 2% extra
- Lapped Fibre Cement Painted 2.75% extra

24

Tanks

- To achieve similar capacity
  - Wider/Shallower – No Change
  - Longer & Shallower - Very little change
  - Slats/Slabs - More expensive

25

Milking Parlour

- Provide
- 14 units
- Dairy
- Plant Room
- Holding yard with slatted tank
- Drafting area with small crush

- Cost €5,270per unit
- 18 Units
- As Above
- Cost €4,700per unit.

26

Grant Aid on Milking Parlours

- **Parlour** €287 sq.m. = 37.5%
- With 2 No. runs of **slotted drains** = 35.5%
- With **dye** in floors = 34.5%

- **Dairy** €400 per sq.m. = 32%
- With dye in floor - 30.5%
- Pl**ant Room** €166 per sq.m. = 17.5%
- **Holding Yards/Drafting Areas** etc = 51%

27

Silage Storage

- **Silo Slab 1000 Tonnes**
- @ €33.60 per Tonne
- Grant Aid €15.60 per Tonne = 46.5%

- **Walled Silo 1000 Tonnes**
- @ €49.20 per Tonne
- Grant Aid €23.40 per Tonne = 47.5%

- **Walled Silo with end wall**
- @ €55.90 per Tonne
- Grant Aid €26.83 per Tonne = 48%

- **Silage Aprons extra to above**

28

Cost Analysis

- Farmers doing work themselves

- Farmers doing part of work

29

Single Tank

• Slats	22.5%
• Concrete	20.0%
• Labour	19.0%
• Excavation & Backfilling	17.0%
• Reinforcing	14.0%
• Casing, Screeds etc	5.0%
• Hardcore	2.0%
• Joints	.5%

30

Double Tank

- Slats 23.6%
- Concrete 23.0%
- Labour 18.4%
- Excavation & Backfilling 12.0%
- Reinforcing 14.0%
- Casings, Screeds etc 6.4%
- Hardcore 2.4%
- Joints .2%

31

Triple Tank

- Slats 26.0%
- Concrete 24.0%
- Labour 16.2%
- Excavation & Backfilling 11.3%
- Reinforcing 13.8%
- Casings, Screeds etc 6.0%
- Hardcore 2.5%
- Joints .2%

32

Internal Floors

- Concrete 40%
- Stripping, Hardcore, Compaction Polythene 35%
- Labour 25%

33

Roofs

- Material 68%
- Erection/Lifting Equipment 22%
- Fabrication Costs 7%
- Delivery 3%

34

Penning

- Gates, Neckrails, Sliding Doors etc.
  - Material Costs 36%
  - Fabrication Costs 35%
  - Site Fitting Cost 29%

35

Silage Slab

- Concrete 32%
- Preperation 30%
- Labour 22%
- Joints 16%

36

Silage Wall

- Concrete 47%
- Labour 25%
- Reinfrocing 19%
- Casing 7.5%
- Excavation etc 1.5%

37

Paperwork/Certificates

- Have all work completed by mid-November
- Remind contractors to have all necessary certificates ready
- If you are not comfortable with the paperwork, ask for help
- Biggest delay in grant payments is paperwork not in order.

38

Paperwork Required

- **Farmer:**
  - Card A – signed and returned to AES
  - Your Tax Clearance Cert
  - Card C and other forms, at end
- **Contractor**
  - C2 Certificate
  - Concrete Cert
  - Protection of Structural Steel Cert
  - Slat Cert
  - Timber Cert
  - Invoices, marked paid and signed

Electrician

Electrical Certs

39

Getting a good Job done

- Good design is a huge long term resource.
- Keep in communication with your contractor.
- Outline your preferred options.
- It will be worth the wait !!!

40

SPECIFICATIONS FOR FARM STRUCTURES

Robert Leonard, Department of Agriculture, Fisheries and Food

Introduction

The Department of Agriculture, Fisheries and Food launched the revised Farm Waste Management Scheme in March 2006. Under this scheme farmers may claim up to 60% of the cost of construction works for facilities for controlling slurry, effluent, silage effluent, and farmyard manure. The scheme closed for applications at the end of December 2006, and by then approximately 48,000 applications had been received by the Department of Agriculture and Food seeking approval for grant-aid towards the construction of pollution control facilities. Of these applications 46,132 completed their applications by 31 June 2007. To date approximately 39,500 approvals have been issued to farmers, and approximately 5,500 payments have been made. Under this scheme it is required that all claims for grant-aid on completed buildings be submitted by 31^{t} December 2008.

In July 2007 the Department of Agriculture, Fisheries and Food launched the Farm Improvement Scheme. Under this scheme farmers may claim up to 40% of the cost of construction for a wide range of farm improvement facilities. This scheme was suspended for applications at the end of October 2007 following receipt of approximately 12,000 applications. Under this scheme over 4,000 applications have already been issued, and payments are already being made.

All farm structures being built under either of the schemes must be built in compliance with the relevant Department of Agriculture, Fisheries and Food specifications. Failure to comply with the specifications can result in penalties of up to 100% of grant-aid payable. In addition, failure to follow the specifications for slurry, effluent and farmyard manure stores is a breach of the nitrates regulations and may result in penalties under the single payment scheme.

This paper looks briefly at the main specifications of the Department of Agriculture, Fisheries and Food and where to access the required information.

Use of specifications

Where a farmer is undertaking any grant-aided building works, they must follow the relevant Department of Agriculture, Fisheries and Food specification. The receipt of a specification by an applicant does not imply approval of a grant application, however, once approval is given then this specification becomes part of the contract between the applicant and the Department of Agriculture, Fisheries and Food. If the

specification is fully complied with grant-aid will be paid, however, where a specification is not complied with no payment will be made until the deficiencies have been remedied. Compliance with the specifications is essential for payment of grant-aid.

Compliance with the Department of Agriculture and Food specifications for slurry storage is a legal requirement. This means that in any case where a slurry, effluent or farmyard manure store is constructed, the store has to be constructed in accordance with the relevant Department of Agriculture and Food specification whether or not grant aid is being sought.

Where it is desired to undertake work that is not in compliance with the specifications of the Department of Agriculture, Fisheries and Food such as high eaves, larger spans, deep tanks, then it is required that the applicant retain a Chartered Engineer to undertake a full design of the proposed structure.
The proposed design has then to be submitted to the Specialist Unit of the Specialist Farm Services, Environment and Evaluation Division of the Department of Agriculture, Fisheries and Food.

Main specifications of Department of Agriculture and Food (S. 101 and S.123*)*
The two main specifications of the Department of Agriculture and Food are "S. 101: minimum specifications for the structure of agricultural buildings"; and "S. 123: minimum specification for bovine livestock units and reinforced tanks". These two specifications cover the majority of grant-aided work carried out on farms and no housing can be built without reference to S. 101.

In all specifications safety is mentioned at the beginning, and it places an onus on all people working on the site to work in a safe manner. The wording in the specification is as follows: "Applicants are reminded that they have a duty under the Safety, Health, and Welfare at Work Act 2005 to provide a safe working environment on the farm, including farm buildings, for all people who may work on that farm. There is a further duty to ensure that any contractor, or person hired to do building work, provides and/or works in a safe environment during construction."

SPECIFICATION S.101: Minimum specifications for the structure of agricultural buildings.
This specification is a manual on the construction of farm buildings. It is divided into three sections: Introduction, Section A – Building Specifications, and Section B – General Clauses.

The introduction of specification gives details in relation to safety, structure terminology and a brief description of each building type in Section A. Section A of

the specification gives details and requirements for each of the following types of structure: Simple Steel Frame, Steel Frame with Steel Truss Roof, Steel Portal Frame, Simple Timber Frame, Traditional Solid Wall with Timber Roof, Timber Portal Frame, Concrete Framed Structure, and Steel Hooped Structure.

For the first five structure types the specification S.101 sets out detailed requirements for each building type. Where sizes are given they are the minimum acceptable for grant-aided work, however, in some case higher standards may be required, i.e., in case were the eave height exceeds four metres the stanchion sizes will need to be increased.

Section B of the specification details the general clauses that apply to all buildings. These details include eaves height, roof slope, ventilation, protection of steel, stanchion elimination, grafting, concrete specification, foundations, floors, walls, roof cladding, purlins, side rails and fixing of cladding, roof drainage, electrical installations, natural lighting, doors and certificates. It is important that all of these clauses are followed closely as failure to do so will result in penalties or non-payment of grant-aid. Rectification of issues is both costly and time consuming.

The main items to ensure at design stage of the building are the eave height, roof slope and ventilation are correctly sized. During construction it is important to ensure that all steel work and bracing is of the required size and correctly treated. With the pressure on building materials it is very important to ensure that timber purlins that are used have been fully dried and treated to IS144 and are certified as such. Purlins not fully dried and treated will warp and sag. Also all cladding used must be set out on specification S.102. Failure to use approved cladding materials will lead to refusal of grant-aid.

SPECIFICATION S 123: Minimum Specification for Bovine Livestock Units and Reinforced Tanks.

This specification gives details on the design requirements for slatted, loose, cubicle and suckler housing as well as details on the construction of reinforced mass concrete tanks.

The specification is set out in a number of sections: safety, building design (internal layout), components, tank design, construction data, siteworks, concrete specification, concrete works for tanks and reinforcement.

The specification must be followed in detail if grant-aid is to be paid, and the tanks to meet their design life. There is a lot of detail given in the specification, however, if read carefully it is reasonably easy to follow. The issues to be currently aware of are

that all concrete shall be of at least 35N strength, and were the tank is for silage effluent the concrete shall be a minimum of 40N. Where buildings have been designed with cubicle beds to be constructed on slats, this is permitted for any building where approval to commence construction is received prior to 1 July 2007. After this date precast cubicle beds shall be used if it is desired to have cubicle beds over slats.

SPECIFICATION S.148: Minimum Specification for Farm Fencing.

This is a relatively new specification, having been released in September 2007. The main feature of this specification is the requirement that all posts used in grant-aided fencing erected after 1 March 2008 shall be certified by the new Irish Standard IS 436. This standard set out the requirements for the correct drying and treatment of fence posts. To meet the requirements of the standard posts must be dried to a maximum of 26% moisture content before being treated with an approved preservative.

It will also be required that all posts be certified to the required standard, and the Department of Agriculture, Fisheries and Food are currently working with the industry to produce a simple workable system to ensure full traceability and the delivery of quality posts to farmers. Posts produced to this standard should last for 15 years before failing.

Concrete certification

To streamline the concrete certification procedures and to ensure clarity as to the requirement for concrete certification, the Department of Agriculture, Fisheries and Food has decided, in consultation with the concrete industry to set the recently adopted European concrete manufacturing standard, I.S. EN 206-1:2002 as the required audit standard for concrete manufacturing plants. This will ensure a fully independent third party auditing of concrete plants. The plants will be audited by either the NSAI, BSI or QSRMC and full lists of audited plants can be found on their respective websites. The concrete manufacturing plants are still required to complete the “concrete manufacturer’s specification certificate” for all concrete used in grant-aided structures.

The minimum strength concrete that is permitted to be used in any agricultural building is 35N, and where the structure will be in contact with silage effluent the minimum requirement is 40N.

There are currently over 180 concrete manufacturing plants audited to I.S. EN 206-1:2002 and the number of plants is increasing on a weekly basis. This new system will help ensure the use of high quality concrete in agricultural buildings.

Specifications covered by nitrates regulations

Under the nitrates regulations the construction of slurry, effluent and farmyard manure stores shall be built in line with the minimum specification of the Department of Agriculture and Food. The specifications that are affected by this requirement of the regulations are:

- S. 108: Minimum specification for manure pits and dungsteads
- S. 122: Minimum specification for proprietary over-ground circular slurry/effluent stores
- S. 123: Minimum specification for bovine livestock units and reinforced tanks
- S. 123A: Minimum specification for the extension of concrete tanks
- S. 126: Minimum specification for geomembrane-lined slurry/effluent stores, and ancillary works
- S. 131: Minimum specification for earth-lined slurry/effluent stores, and ancillary works
- S.132: Minimum specification for out wintering pads

Specifications S. 122 and S. 126 require that contractors carrying out the work are accepted by the Department of Agriculture and Food. Lists of accepted contractors are available on the Department's website. Specifications S. 131 and S. 132 require site assessments to be carried out by appropriately trained site assessors.

Specifications S.122, S. 123A, S. 126, S. 131 and S. 132 all require that the works are certified by the contractor, or a Chartered Engineer as having being completed in line with the requirements of the specifications.

Specification S131 requires that a contractor construct the entire store. It is not permitted for a farmer to construct an earth-lined slurry/effluent store.
Specification S.132 requires that a contractor construct the liner of the out-wintering pad. It is not permitted for a farmer to construct the liner of an out-wintering pad.

Availability of specifications

All of the Department of Agriculture and Food specifications are available on the Departments website at www.agriculture.gov.ie in both word document format and PDF format. All the specifications may be downloaded free of charge. In addition to this copies of the specifications are available from the local AES offices of the Department of Agriculture and Food. The versions of the specifications that are on the website are the most up to date versions, and it is advisable to check the website on a regular basis for any changes.
Where buildings are being built with grant-assistance then the appropriate specification to use is the specification that was in force on the day the Department of Agriculture and Food issued the approval letter to the farmer. In every case the

farmer will receive copies of all relevant specifications with their approval, so if there is a doubt as to the standard required check the specifications received by the applicant with their letter of approval.

Also available on the Department's website are:

- Accepted slat list
- Cladding list
- Accepted list for simple aeration systems
- Accepted list of precast wall panels
- Recommended animal areas
- Copies of certificates
- Circulars
- Planning exemption rules and farm structures list for determining if structure requires planning permission
- National Standard costs for 2007

Conclusion

In every case the building specifications shall be followed in order to draw down the grant-aid. The specifications give detailed information as to what is required to be undertaken for grant-aid to be paid. In most cases more than one specification will be required to be followed for the completion of a building.
It is important that all aspect of the specifications are followed to ensure safe buildings with a good working life. The proper handling of concrete is integral to the construction of a quality farm building.

Where the specifications are followed in detail grant-aid will be paid once all other paper work is in order.

TECHNICAL DEMONSTRATION PANELS


Trade Stands
Roadway
New Parlour
Trade Stands
Trade Stands
New Dairy Unit
Trade Stands
Old Dairy Unit
Trade Stands
Trade Stands
Front Yard
Suckler unit
Horses
Beef unit
Straw bed
Horses
Trade Stands
Demo Unit
Calf Hse
Roadway
Location of Trade Stands

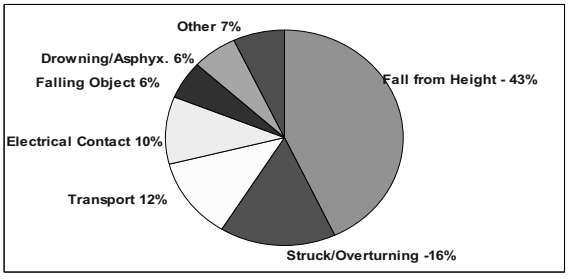
Build in Safety
- It's Your Responsibility

Build in Safety – know your legal responsibilities

- **Legislation includes:**
  - Safety, Health and Welfare at Work Act, 2005
  - Safety, Health and Welfare at Work (Construction) Regulations, 2006
  - Advisory booklet available

Causes of Construction Deaths

- 46% on sites with <5 employees.



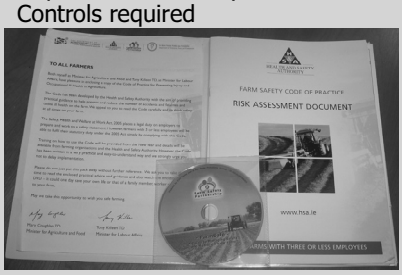
Choosing a Building Contractor

- Appoint Project Supervisor Construction Stage (PSCS)
- Contractor has Safety Statement and uses Safe Methods
- Workers have 'Safe Pass' and CSCS Cards
- Contractor and Farmer have Adequate Insurance

Teagasc
Agriculture and Food Development Authority

Manage Safety and Health on your Farm

- Complete the Farm Safety Code of Practice
- Half-day Training Courses provided by Teagasc
- Implement the Safety and Health Controls required



Teagasc
Agriculture and Food Development Authority

Ventilation

Good ventilation promotes good animal health and prolongs the life of animal housing

Critical Issues

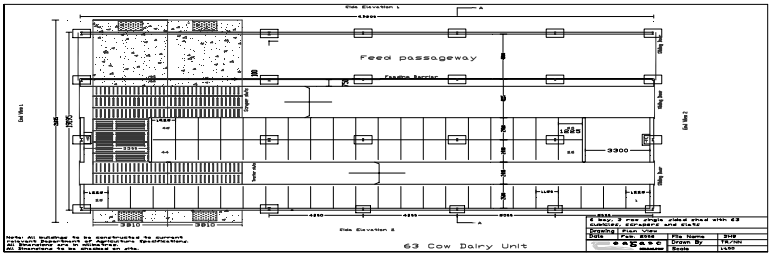
- **Inlets – size and type**
- **Outlets – size and type**
- **Roof slope**
- **Air space**

Ventilation Options – S123

[redacted]

Standard Drawings from your Teagasc Adviser

Sample Drawing

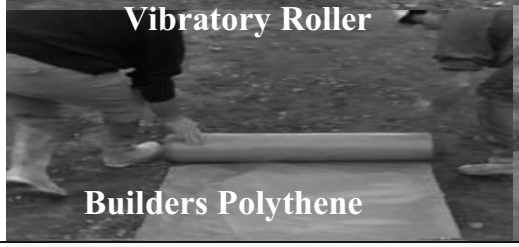


Over 400 drawings of standard designs available through your Teagasc adviser

Good quality drawings are needed for:

- Planning permission and grant purposes
- Quotations from your contractor
- Ensuring a good designs

Laying a Silage Slab



Laying a Silage Slab

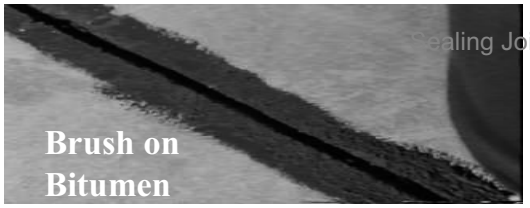
Contraction Joints

- Cut or pre-form
- 40-50mm deep
- 4.5m x 6m or 5m x 5m

Silage Pits

Costs (excl. VAT)

•Pit floor (incl. 75mm x 75mm side channels)	€42 per linear metre
•Large front channel	€63 per linear metre
•Large front channel replacement	€140 per linear metre
•75mm x 75mm side channels	€12
•2.4m silage wall	€400 per linear metre
•Guide rails	€23 per linear metre



Department Specifications

Tune-in to the Specifications

•Build to the current relevant specifications

•They are minimum specifications

•Where you see "shall" in the specification it means "must"

•Where you see "recommended" in the specification it means it is recommended but not compul sory

Some Relevant Specifications

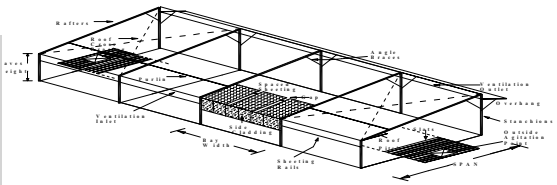
•S102…….Cladding

•S108…….FYM stores and dungsteads

•S123…….Livestock units and concrete tanks

•S128……Silage bases

•S129……Farmyard drainage



Available from:

•Department offices

•www.agriculture.gov.ie

•Teagasc Advisers

Farm Buildings Do your sums before taking the plunge!

Questions you need to ask..

–Is my farm business currently profitable?

–What is the capacity of my business to meet the costs of the investment?

–What will be the effect of the investment on future cash flow and profitability?

Teagasc can help you answer these questions – Talk to your adviser!

Considering a New Farm Building?

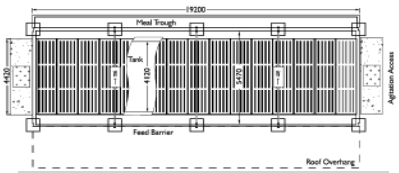
- **Leave aside the grant and justify the investment..**
  - –Is it necessary to the future of your farming business?
  - –Will it improve output?
  - –Will it reduce costs?
  - –Will it reduce labour?

- **What is the net cost of the investment?**

  What is the capital cost (less the grant)?

  Are there any other costs?? e.g. Local development charges

A Slatted Unit For 44 Fattening Cattle



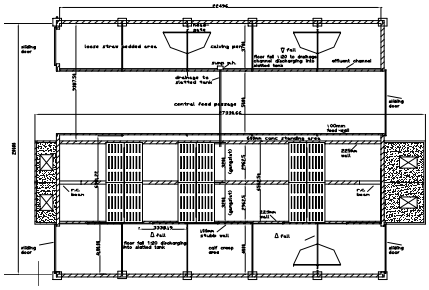
- 4 Bay shed with 4.4m (14'6") slat
- 2.4 sq m per animal
- Open front with 2.5m overhang

Slatted Unit Cost

Stanchion bases		€1,700
Roof		€15,160
Side cladding		€1,500
Walls		€4,241
Internal concrete		€554
External concrete		€5,450
Penning (incl. troughs)		€1,620
Feeding barrier walls		€1,730
Water		€484
Electricity		€870
Gross Cost		€63,969
Grant at 60%		€32,909
Cost after grant		€31,060
Planning permission drawings	€800	
Planning permission fees	80	
Grant application	€200	
	€1,080	
Net Cost		**€32,140**
Net Cost per animal		**€730**
Cost per animal without grant		**€1,478**

All figures exclude VAT

Kildalton 60 Cow Suckler House



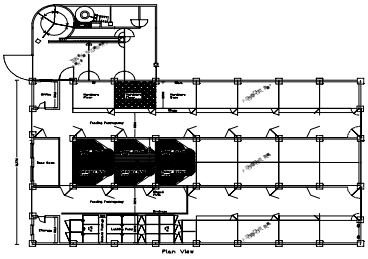
- Double 3.2m (10'6") slat with 4m creep
- 2.6 sq m per cow
- Good handling facilities for calving

Kildalton 60 Cow Suckler House Costs

Side cladding		€4,250
Wall foundations		€3,127
Walls		€9,440
Internal concrete		€9,424
External concrete (4.5m)		€4,800
Penning		€12,492
Doors		€12,600
Water		€800
Electricity		€2,610
Gross Cost		€178,023
Grant at 60% of €120,000		€72,000
Cost after grant		€106,023
Slat Mats	€3,009	
Planning permission drawings	€1,500	
Planning permission fees	300	
Grant application	€200	
	€5,009	
Net Cost		€111,032
Net Cost per cow		€1,851
Cost per cow without grant		€3,051

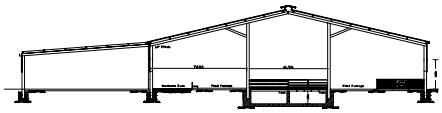
All figures exclude VAT

Kildalton 250 Ewe Sheep House



- Using both slatted and straw bedded pens (1.4 sq m per ewe)
- Individual lambing pens :
  - 4 pens 1.5m x 1.5m
  - 15 pens 1.2m x 1.8m
- Integrated handling facilities

Kildalton 250 Ewe Sheep House



- Using both slatted and straw bedded pens (1.4 sq m per ewe)
- Individual lambing pens :
  - 4 pens 1.5m x 1.5m
  - 15 pens 1.2m x 1.8m
- Integrated handling facilities

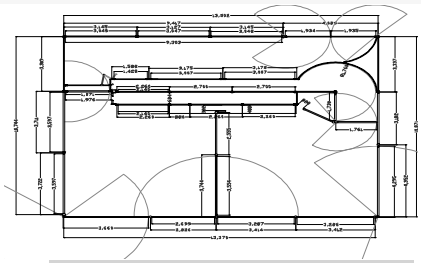
Kildalton Sheep House Costs*

Items	Not grant aided	Grant aided
Tank		€16,335
Stanchion bases		€800
Roof		€58,320
Side cladding		€4,450
Wall foundations		€2,828
Walls		€6,650
Internal concrete		€15,167
External concrete (4.5m)		€4,477
Feed barriers		€6,250
Penning		€5,230
Lambing pens		€3,800
Doors		€14,400
Water		€2,400
Electricity		€4,112
Gross Cost		€145,219
Grant at 60% of €120,000		€72,000
Cost after grant		€73,219
Planning permission drawings	€1,500	
Planning permission fees	300	
Grant application	€200	
	€2,000	
Net Cost		€75,219
Cost per Ewe		€301

* Costs outlined are for this shed without the demonstration roo ms and sheep handling unit

All figures exclude VAT

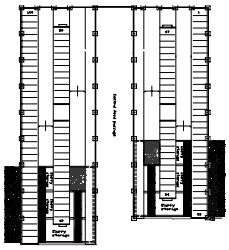
Kildalton Outdoor Handling Unit



• Excavation and hardcore base	€500
• Steelwork and fitting	€11,000
• Concrete work	€920
Total	€12,420

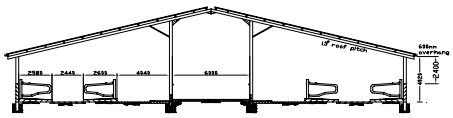
All figures exclude VAT

Kildalton 122 Cubicle House



- 122 cubicles (2.6m x 1.16m)
- 12% of roof sheeting is transparent
- 4.35m height at eaves and 15° roof pitch
- 0.67m feed space per cow
- 7.8 sq m floor space per cow
- Can be divided into 6 groups

Kildalton 122 Cubicle House



- 122 cubicles (2.6m x 1.16m)
- 12% of roof sheeting is transparent
- 4.35m height at eaves and 15° roof pitch
- 0.67m feed space per cow
- 7.8 sq m floor space per cow
- Can be divided into 6 groups

Kildalton Cubicle House Costs*

Stanchion Bases		€4,250
Roof		€123,400
Side Cladding		€6,870
Cubicles		€29,890
Wall foundations		€5,443
Walls		€15,429
Internal concrete		€17,152
External concrete		€4,050
Gates		€2,400
Feeding barriers		€8,500
Feeding barrier walls		€2,642
12 No sliding doors		€20,880
Water		€3,966
Electricity		€7,157
Scrapers		€11,000
Cubicle Mats	€5,002	
Standing mats	€5,047	
Planning permission drawings	€1,500	
Planning permission fees	300	
Grant application	€200	
Totals	€12,049	€343,529
Gross		€355,578
Grant on shed 60% of€120,000		€72,000
Grant on scraper		€4,400
Net cost after grant		€279,178
Cost per cow without grant		€2,915
Net cost per cow (after grant)		€2,288

* Costs outlined are for shed finished at both ends but not incl uding covered collecting yard (i.e. gable sheeting and doors at both ends of shed)

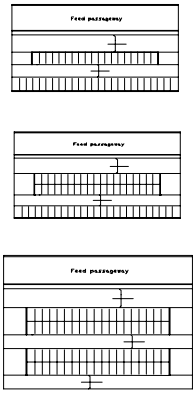
All figures exclude VAT

Cubicle House Layouts

2 Row
- 7.0 to 7.5 sq. m. per cow
- 0.65 to 6.8m feed space
- Double up common

3 Row
- 6.5 to 6.8 sq m per cow
- 0.45m feed space
- Double up common

4 Row
- 6.7 sq m per cow
- 0.35m feed space

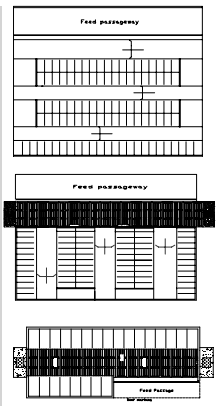


Cubicle House Layouts

5 Row
- 6 bay shown
- 6.4 to 6.1 sq. m. per cow
- 0.29 to 0.3m feed space
- 96 or 101 cubicles

Feeding at 90° to cubicles
- 64 cubicles
- 6.7 to 7.0 sq m per cow
- 0.34m feed space

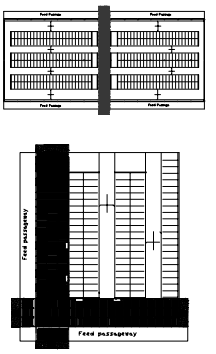
Short feed passage
- 6.0 sq m per cow
- 0.4m feed space



Cubicle House Layouts

Feeding on outside
- 6.1 sq m per cow
- 0.48m feed space

L-Shaped feeding
- 6.8 sq m per cow
- 0.55m feed space



Cubicle Design

Design criteria

- Dimensions:…… length, width, end cubicle widths
- Cubicle divisions……..... type, shape, height, fixing
- Front rails, neck and lower rails…. height and location of each
- Beds…….…… slope, step height,brisketboard, mats

Dimensions of cow cubicles

Width (centre to centre) +/- 0.025	1.15 metres
Total length (rows towards wall)	2.3 – 2.7 metres
Total length (rows head to head and single rows with no front wall)	2.21 – 2.45 metres
Brisket board/pillow from rear kerb (if fitted), +/- 0.05m	1.75 metres
Neck rail from rear kerb, +/- 0.05m (measured horizontally)	1.70 metres
Height of neck rail, +/- 0.05	1.15 metres
Cubicle bed slope +/- 1%	5%
Bedding height above the passageway floor	0.2 – 0.25 metres

Problems?

Observe cow behaviour when using cubicles

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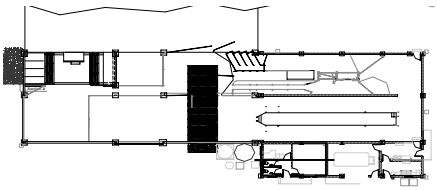
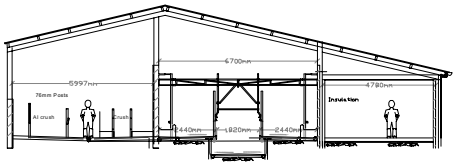
Kildalton Milking Facilities



- 16 Units (710mm or 2'4" between units)
- Swing over arms
- Meal feeding
- Variable milk pump
- Single stage Milk cooler
- Auto washer
- Teat spray
- Milk diversion line
- Auto baling
- Milk meters
- Low level wash line
- Auto Cow ID
- 3-way drafting
- Backing gate and scraper

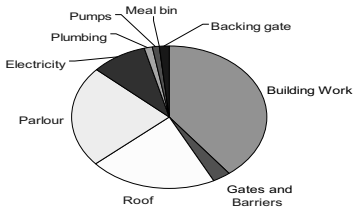
Teagasc
Agriculture and Food Development Authority

Kildalton Milking Facilities



- Pit 1.82 meters wide
- Pit edge to wall 2.44 meters
- Pit depth designed to suit people who will be milking most in parlour

Kildalton Milking Facilities Cost*

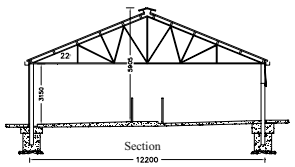


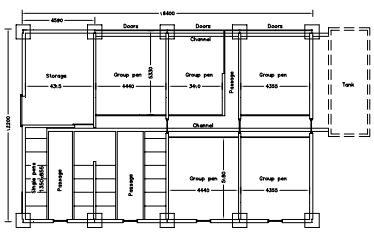
Parlour inc drafting unit		€47,712
Low line wash		€1,600
Baling		€11,015
Full auto ID inc milk recording system		€34,900
Backing gate/scraper		€6,990
Total		€102,217

* Costs are indicative only

All figures exclude VAT

Kildalton Calf House





Plan

Kildalton Calf House Cost

Tank		€4,000.00
Stanchion Bases		€1,400
Roof		€22,500
Side Cladding		€2,750
Wall foundations		€3,551
Walls (Block-Paster finish)		€15,800
Internal concrete		€7,340
Gates		€2,797
Elevated calf pens		€4,400
Doors		€7,800
Water		€500
Electricity		€1,575
Gross		€74,413
Grant at 60%		€44,648
Cost after grant		€29,765
Items not eligible for grant		
Planning permission drawings	€800	
Planning permission fees	300	
Grant application	€200	
	€1,300	
Net Cost		€31,065

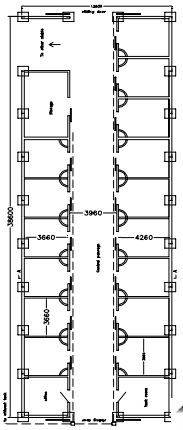
Indoor Calf Rearing

- Calves are housed in individual pens for the first 10-14 days – 1.6 m² per pen
- Individual pens €220+VAT
- Moved into group pens in groups of about 10
- Group Pens 23 m² - enough for 14 calves
- Allow inlet and outlet of 0.08 m²/calf
- Air space 1016 m³, should be 6 - 8 m³ /calf

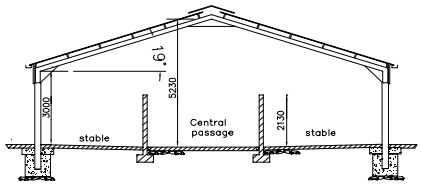
Outdoor Calf Rearing

- Calves are moved outside in their groups usually about 3 weeks old in a sheltered field near yard
- Fed 6 litres once a day with mobile calf feeder
- Concentrates once a day - vermin
- Labour saving
- No difference in calf performance
- Improved health
- Mobile feeder €2500


Kildalton Stable Plan



Kildalton Stable Section



- Standard stable size – 3.6m x 3.6m
- 50 cubic meter air space per horse
- Good ventilation is critical – both at the inlet (below the gutter) and outlet (at the apex)
- A roof pitch of at least 15 ° helps ventilation
- 2.4m high walls
- Central door into each stable allows feeding/watering to either side

Kildalton Stables Cost

Tank		€4,000.00
Stanchion Bases		€2,800
Roof		€ 48,750
Side Cladding		€3,050
Wall foundations		€4,092
2.4 m Walls (Block-Paster finish)		€ 14,379
Internal concrete		€ 15,889
External concrete		€2,340
Steel Stable Fronts (Door, water bowls etc)		€ 22,500
Doors		€3,240
Water		€600
Electricity		€3,100
Gross		€124,740
Grant at 60% of €120,000		€ 72,000
Cost after grant		€ 52,740
Items not eligible for grant		
Planning permission drawings	€1,500	
Planning permission fees	300	
Grant application	€200	
	€2,000	
Net Cost		€ 54,740
Net Cost per stable		€3,041
Cost per stable without Grant		€7,041

All figures exclude VAT