10. Construction and demolition

10.1 Introduction

Waste from construction and demolition (C & D) activities is a key waste stream. Little is known about the quantity of C & D waste in New Zealand, but evidence suggests that it may represent up to 50% of all waste arising. It is also a complex waste stream, made up of a wide variety of materials including concrete, plasterboard, wood, steel, brick and glass.

Because of its quantity and complexity, C & D waste has been identified as a priority waste in the New Zealand Waste Strategy. This strategy has set a target of 50% reduction in construction and demolition waste being disposed of to landfills by 2008. The strategy also requires local authorities to put in place programmes for monitoring C & D waste quantities.

Most construction and demolition waste on farms is a result of general depreciation, wind damage to buildings or replacement shed. It is reasonable to consider that most timber on farms in old buildings is untreated and therefore the disposal of galvanised roof sheeting (a recyclable material) is probably the material of greatest interest when considering impacts on the environment.

10.2 Information sought

Farmers were asked if they had built or demolished a house, milk shed, implement shed, or other type of building in the past 5 years. They were also asked how residual material was disposed. Five years was considered a reasonable duration to account for construction and demolition waste on farms. This allowed for periods of both good and poor payouts, which would have a significant influence on this type of farm work (capital investment).

10.3 Results

Results show that 33 farmers have demolished a building on the farm in the past five years, while approximately 28 had constructed a building in the past five years. It is probably realistic to say that most of these two groups are part of the same set of farmers. It should be noted that farmers may use more than one disposal route for the same material. For example good timber from a demolition may be reused while rotten timber is burned. Results of the survey regarding C&D waste are outlined in Table 32, Table 33, and Table 34.

Table 32 Type of construction undertaken (n=90)

	House (or part of)	Milking shed	Implement shed	Hay shed	Other
Number constructed	4 [4]	5 [5]	8 [9]	2 [2]	9 [10]

Key: numbers in [ ] are percent

Table 33 Type of demolition undertaken (n=90)

	House (or part of)	Milking shed	Implement shed	Hay shed	Other
Number demolished	7 [8]	2 [2]	9 [10]	4 [4]	11 [12]

Key: numbers in [ ] are percent

Slightly more demolition was undertaken in the past five years than construction. This may be because older farm buildings are beyond repair but capital re-investment is not considered justified.

Table 34 Method of disposal of demolition waste in the past five years (n=43)

	Timber	Sheeting	Concrete
Farmers that burn	17 [40]	-	-
Farmers that bury	6 [14]	11 [26]	7 [16]
Farmers tha re-use	13 [30]	15 [35]	6 [14]
Farmers that stock pile	1 [2]	8 [19]	1 [2]
Farmers that dispose/dump	2 [5]	4 [9]	-
Farmers that recycle	-	4 [9]	-

Key: numbers in [ ] are percent.

Material that is in good condition would be reused while the remainder will be disposed by the various methods listed in Table 34. It is interesting to note that 19% of farmers were stockpiling some unwanted sheeting and 9% recycled some or all of their unwanted sheeting. It is reasonable to consider that all farmers find a reuse for their demolition concrete as filler in a track, yard, floor and such.

Conversations with farmers during the survey indicated that a material (e.g. timber) would have to be in a very poor condition for it to be considered unusable.

10.4 Discussion

Five years was considered a reasonable duration to account for construction and demolition waste on farms. This allowed for good and poor payouts which would have a significant influence on this type of farm work. Of the 90 farmers surveyed 28 (31%) had constructed a building on their farm in the past five years while 33 (37%) of those surveyed had demolished a building or buildings on the farm in the past five years.

Of the 28 that constructed eight had built an implement shed which is consistent with nine that demolished an implement shed, two constructed a hay shed while four demolished, five constructed a milk shed while only two demolished, and four built a house while seven demolished.

Reasons for demolition included wind damage, building beyond repair, extension/renovation of existing building, and generally no further use for the building. While more farmers built a milk shed than demolished it is difficult to determine from this survey if this reflects an increase in dairy herd size in the region. Factors/reasons such as amalgamation of farms and the requirement for one large milk shed may explain the difference between construction and demolition numbers.

It was not possible to determine the quantity of material for disposal resulting from demolition work on farms and it was considered that estimates by farmers would be too variable and thus unreliable.

The largest proportion of farmers (40%) that demolished a farm building burned some or all of the resulting timber waste, while 30% achieved some reuse. Reuse of timber and galvanised sheeting depends on its quality. Some farmers burned the

timber in the domestic dwelling fire, while most burned in a pit as part of the clearing-up operation of the demolition works. The principal other reuse for timber was mulch for gardens.

Certainly the increased use of treated timber on farms will place more limits on disposal options for this type of waste material. Conversely, it may increase the lifespan of buildings and the quality of framing timber recoverable at the end of the buildings life, thus reducing the volume of timber for reuse or disposal.

Only 12% of those that demolished a building had their unwanted galvanised sheeting recycled. It was disappointing to note that 33% buried their unwanted sheeting and 12% discharged it to a municipal dump. Certainly the absence of the traditional annual visit by the local scrap dealer has reduced recycling of galvanised sheeting.

There was good reuse of demolition concrete on farms mainly for track construction or as filler for yard areas.

10.5 Future disposal options

Farmers might benefit from best practice disposal guidance for C&D waste generated on their farm. This could include estimating what quantity would be generated and planning its disposal. This information could be publicised by appropriate avenues.

11. Farm detergents

11.1 Introduction

Farm detergents, such as acids and alkalis, are used by dairying farmers to clean milk sheds and milking equipment. Acid is usually bought in liquid form and typically comes in 100 litre and 200 litre volumes. Alkali is usually bought in 25kg buckets (20 litre volume) in dry form and dissolved in water when required. These cleaning and sterilising agents result in empty containers which require disposal. The use of teat spray was also surveyed as this is typically applied at milking time and was incorporated into this section.

11.2 Information sought

Farmers were asked what quantity of acid and alkali they used and in what form and volume/weight it arrived on the farm. The same questions were asked concerning teat spray. Farmers were also queried on whether they had any unwanted farm detergents or containers and how these were disposed.

11.3 Results

Of the 90 farmers surveyed 78 (87%) responded to questions regarding container disposal. This closely associates with the proportion of farms in the survey which are dairying (84%). 69 farmers responded to questions regarding detergent container size and 53 responded to teat spray container size. Table 35 shows the various disposal routes for containers, and farmers may use several for a particular item. Table 36 records the detergent containers sizes. Some farmers did not know the container size, which is probably due to a sharemilker controlling this aspect of the farm operation. No farmer had waste/unwanted detergent on their farm which indicates that there are very few farms with this type of waste material.

Table 35 Method of disposal of waste detergent containers (n=78)

	Burn	Bury	Re-use	Re-use + burn	Re-use + bury	Stock pile	Waste bin/skip	landfill	Return	Recycle
No. of farmers	12 [15]	3 [4]	56 [72]	1 [1]	1 [1]	14 [18]	1 [1]	2 [3]	9 [12]	5 [6]

Key: numbers in [ ] are percent

Table 36 Detergent container size (n=69)

	<100 Litres	100 Litres	200 Litres
Acid	4 [6]	18 [26]	47 [68]

Key: numbers in [ ] are percent

Table 37 Detergent container size (n=69)

	Sachet	20-25 kg
Alkali	6 [9]	63 [91]

Key: numbers in [ ] are percent

Table 38 Teat spray container size (n=53)

	Sachet	20 Litres	100 Litres	200 Litres
Number of farmers	4 [8]	11 [22]	18 [37]	16 [33]

Key: numbers in [ ] are percent

Table 39 Acid detergent container 200 litres [as used by 68% of dairy farmers*]

Containers/year	0.5	1	1.5	2	3	4	5
No. of farmers	3	15	5	9	3	1	1
Total no. of containers	1.5	15	7.5	18	9	4	5

Key: * 6% of farmers use less than 100 litres

Table 40 Acid detergent container 100 litres [as used by 26% of dairy farmers*]

Containers/year	1	2	3	4
No. of farmers	2	5	2	2
Total no. of containers	2	10	6	8

Key: * 6% of farmers use less than 100 litres

Table 41 Alkali detergent container 20 litres [as used by 91% of dairy farmers*]

Containers/year	1	2	3	4	5	6	7	8
No. of farmers	5	13	13	5	2	2	1	1
Total no. of containers	5	26	39	20	10	12	7	8

Key: * the remaining % of farmers use alkali sachets

Table 42 Teat spray 100 litres container [as used by approximately 37% of dairy farmers]

Containers/year	0.5	1	1.5	2	3
No. of farmers	2	8	3	4	2
Total no. of containers	1	8	4.5	8	6

Key: * the remaining 8% of farmers use alkali sachets

Table 43 Teat spray 200 litres container [as used by approximately 33% of dairy farmers]

Containers/year	0.5	1	2
No. of farmers	1	12	2
Total no. of containers	0.5	12	4

Key: * the remaining 8% of farmers use alkali sachets

Table 44 Teat spray 20 litres container [as used by approximately 22% of dairy farmers]

Containers/year	1	1.5	2	5	8
No. of farmers	6	1	2	1	1
Total no. of containers	6	1.5	4	5	8

Key: * the remaining 8% of farmers use alkali sachets

Four farmers stated that they used teat spray sachets which required dissolution in water. These sachets are usually 125g packs size.

Table 45 Summary of estimated empty containers generated on farms in the region each year

	200ltr. Acid container	100ltr. Acid container	20ltr. Teat spray container	100ltr. Teat spray container	200ltr. Teat spray container	Sachet teat spray	20kg alkali bucket	Sachet alkali
% of dairy farmers* using	68%	26%	22%	37%	33%	8%	91%	8%
Regionalised no. of farmers with	1714	655	554	932	831	202	2293	202
Average number of containers per dairy farm	1.62	2.36	2.23	1.53	1.13	NA	3.02	NA
Regionalised quantity of containers*	2777	1546	1235	1426	939	NA	6925	NA

Key: * 2520 equals 100% of dairy farmers as surveyed (84% of those surveyed were dairy farmers) of the 3,000 farmers in the region
NA = not applicable

Total number of acid, alkali and teat spray containers generated in the region each year is approximately 14,866.

Photo 7 Alkali sachets (left), and acid detergent container halved and reused as milk trough (right)

11.4 Discussion

Farm detergent containers were perceived to have greater reuse potential than agrichemical containers due to their contents being less 'dangerous' than agrichemicals, and the high quality/density of plastic used for farm detergent containers results in considerable reuse. For example, it is common to see 100 and 200 litre acid detergent containers cut in half and used as milk troughs for calves. As shown in Table 35 there is a general sense of unwillingness to destroy these containers with preference to reuse, return or stockpile. This is supported by the figure of 72% of farmers that stated they find a reuse for some or all of these containers. Only 15% burn, 4% bury on the farm, and 3% send to landfill (probably by skip). Table 36 shows the number of farmers that use acid containers of different sizes. The majority of dairy farmers (68%) buy 200 litre volumes, 26% buy 100 litres size containers and 6% purchase in <100 litre volumes. Some farmers were unsure of the acid detergent container size which was probably due to the fact that a sharemilker took care of this aspect of the farm operation.

Of the 84 dairy farmers surveyed 26% stated they purchase acid in 100 litre containers and approximately 2.4 containers per year. Of the 2,520 dairy farmers in

the region this equates to approximately 1,564 containers of 100 litre size generated on dairy farms per year in the region (see Table 40 and Table 45).

Likewise for 200 litre containers, 68% of dairy farmers surveyed stated they use this size container, and on average generate 1.6 per dairy farmer year (see Table 39 and Table 45). Regionally, this equates to approximately 2,777 containers of 200 litre size per year. Combined, there are approximately 4,341 containers of 100 and 200 litre size generated on farms in the Taranaki region annually.

91% of dairy farmers surveyed used 25 kg buckets (20 litres) of alkali and generated approximately 3.0 containers per year. Therefore, there are approximately 6,925 empty alkali buckets generated each year in the region.

With regard to teat spray and information shown in Table 42, Table 43, Table 44, and Table 45 there are approximately 1,426 containers of 100 litre size, approximately 939 containers of 200 litre size, and approximately 1,235 containers of 20 litre size generated each year in the region. Combined, there are approximately 3,600 empty teat spray containers generated by dairy farmers in the region each year.

Combining farm detergent and teat spray containers there are approximately 14,866 empty containers generated by dairy farmers in the region each year.

In Table 35 it is recorded that there is considerable reuse of these type of containers. However, after a certain length of time even these durable containers get damaged etc. and are eventually disposed of by various methods. It was not determined in the survey how these are disposed but it is reasonable to assume that they are disposed of in the same manner as agrichemical containers (see Table 11). If this is so, then 56% of some or all farmers burn these containers, 19% dispose to skip or wheelie bin, and 13% bury.

11.5 Future disposal options

Reuse is in keeping with the aims of New Zealand Waste Strategy and farmers are encouraged to continue to reuse their detergent and teat spray containers.

Reasonable assistance to establish the proposed container collection scheme (see section 4.4) in Taranaki could be provided by parties interested in agrichemical container disposal in the region. Reasonable assistance could include advice on suitable drop-off points, making transfer stations available as drop-off points, promotion by advocacy.

If the proposed collection scheme does not proceed then a once off, stand-alone collection, based on the proviso that there is an end disposal route for the collected containers i.e. plastics recycling company, may be worth investigating.

12. Animal medicines

12.1 Introduction

Animal medicines are an important component of today's farm. Problems such as mastitis or parasitic infection must be dealt to if animal health and farm profits are to be maintained.

While medicine containers were not expected to represent a large quantity of waste produced on farms nonetheless it was important to measure the situation. For the sake of ease when carrying out the survey, pour on containers were incorporated into this section as the liquids contained within prevent animal ill health.

12.2 Information sought

Farmers were asked if they had any waste medicines on their farm, what quantity and how they intended to dispose of them. They were also asked about the quantity and disposal method of waste glass and plastic medicine containers, syringes and needles, mastitis tubes, and pour on containers.

12.3 Results

Only 11 farmers stated that they had waste medicine on their farm, and the volumes concerned were very small. This confirmed that there is a very small amount of waste medicine in the region (see Table 46).

Table 46 Volume of waste medicine (n=11)

	< 50 ml	50 – 100 ml	100 – 200 ml	> 200 ml
Number of farmers	5 [46]	3 [27]	2 [18]	1 [9]
Regionalised quantity	Max. 8.28 litres	4.5 – 8.9 litres	5.9 – 11.8 litres	Min. 5.9 litres

Key: numbers in [ ] are percent

Most of this was stockpiled (sitting on a shelf), or would be disposed of by burning and then buried in the farm pit.

Table 47 Method of disposal of waste medicine (n=11)

	Burn	Bury	Re-use	Stock pile	Waste bin/skip	landfill	Return
Number of farmers	1 [9]	4 [36]	0 [0]	3 [27]	2 [18]	0 [0]	1 [9]

Key: numbers in [ ] are percent

Medicine containers disposal was predominated by the burn and bury method for both glass and plastic containers. Typically, the container is disposed to the farm pit and what does not burn remains in the pit and is later buried. The other significant disposal route is the skip or wheelie bin. The wheelie bin is capable of taking the volume of waste medicine containers produced on farms each year.

Table 48 Medicine container disposal methods

	Burn	Bury	Waste bin/skip	Landfill	Stockpile
Glass (n=78)	-	50 [64]	21 [27]	6 [8]	1 [1]
Plastic (n=82)	52 [63]	8 [10]	18 [22]	3 [4]	1 [1]

Key: numbers in [ ] are percent

An average of 17 waste syringes and needles per farm are produced each year. This was a difficult waste to quantify since some farmers used a syringe and needle only once while other farmers used the syringe for as long as possible. In terms of the volume and weight of waste generated on farms in the region this waste material is insignificant. It is estimated that approximately 49,000 waste needle and syringes are generated in the region each year (see Table 49).

Table 49 Waste syringes and needles

	Number of farmers with waste syringes	Average number of waste syringes per farm per year
Used syringes	86	17
Regionalised quantity	2880	48,960

Key: numbers in [ ] are percent

Most syringes and needles were disposed by the burn and bury method (see Table 50), while most of the remaining were disposed of to a skip or wheelie bin. Provided the waste is not handled by people at a later stage then this is an acceptable disposal method.

Table 50 Method of disposal of syringes and needles

	Burn	Bury	Waste bin/skip	Landfill	Stockpile
Syringe (n=86)	36 [43]	18 [21]	22 [26]	5 [6]	3 [4]
Needle (n=82)	-	52 [63]	22 [27]	5 [6]	3 [4]

Key: numbers in [ ] are percent

The average number of dairy cows milking or in calf in Taranaki was recorded as 283 per dairy farm by the Agricultural Production Census 2002. The average number of mastitis tubes used was recorded by this survey as 529 per farm (see Table 51). This indicates that approximately two waste mastitis tubes per cow per year are generated in the region. This is equivalent to 1.3 million waste mastitis tubes per year for the region, of which 61% of farmers burn, 27% dispose of to skip, and 10% bury (see Table 52).

Table 51 Occurrence of mastitis tubes and pour-on containers

	Number of farmers	Average number per year
Waste mastitis tubes	62~	529/farm
Regionalised quantity waste mastitis tubes	2447	1.3 million*
Waste pour-on containers	74~	2.26/each farm in the region
Regionalised quantity pour on containers	2466	5574

Key: numbers in [ ] are percent
* dairy farms only
~ responded to question regarding quantity

A similar disposal pattern was recorded for pour on containers, 57% burn, 23% bury, and 14% dispose of to skip or wheelie bin (see Table 52). The average number of pour on containers generated on a farm in the region each year is estimated at 2.26.

Table 52 Mastitis tube (n=62) and pour -on container disposal (n=74)

	Burn	Bury	Waste bin/skip	Landfill	Stockpile
Mastitis tubes	38 [61]	6 [10]	17 [27]	1 [2]	2 [3]
Pour-on containers	42 [57]	10 [14]	17 [23]	1 [1]	4 [5]

Key: numbers in [ ] are percent

Photo 8 Syringe, needle, and medicine bottle (left), and pour on container and applicator gun (right)

12.4 Discussion

The volume of waste medicine on farms in the region is insignificant. There is probably 40 litres of residues or leftovers generated each year. This is not an environmental risk material. The method of disposal is either to the farm pit or wheelie bin/skip, and the remaining is stored in farm buildings. One farmer stated that he had given his waste or expired medicine back to the vet which is the best disposal method if a farmer is unsure or unhappy over disposal of by other methods.

It is estimated that approximately 49,000 waste needles and syringes are generated in the region each year (17 per farm). This is not a significant quantity of waste when compared to 500 tonnes of plastic wrap generated in the region each year. The principal concern is the safe disposal of the needle sharps. The majority of farmers burn syringes and needles in the farm pit and what is left, the needle, is subsequently buried. It is interesting to note 26-27% of farmers dispose of this waste to their skip/wheelie bin. This was viewed as a safe and convenient disposal method. Certainly, disposal to skip/wheelie bin or burial on farm is a preferable disposal method over burning.

An estimated 1.3 million waste mastitis tubes are generated in the region each year, approximately 2 per cow. 61% of farmers stated that they burn this waste which equates to approximately 0.8 million tubes, 27% of farmers dispose to skip/wheelie bin, and 10% bury. Again the preferred disposal method would be to skip/wheelie

bin and consequently to a managed landfill. If this is not possible burial is preferred rather than burning.

Approximately 5,574 pour on containers are generated in the region each year (1.85/farm in the region). The container size is typically 5 litres, which are some of the smallest waste containers generated on farms. They are also the least reused since their contents are oil based which is difficult to rinse for reuse. 57% of farmers stated that they burn some or all of these containers, 14% bury, and 23% stated they dispose of these to the skip/wheelie bin (see Table 41).

12.5 Future disposal options

Farmers are encouraged continue to dispose of their waste medicine, syringe, needle and pour on container waste to wheelie bin or skip.

There is opportunity to promote the correct disposal methods for this type of farm waste through education.

With regard to pour on containers reasonable assistance to establish the proposed container collection scheme (see section 4.4) in Taranaki could be provided by parties interested in agrichemical container disposal in the region. Reasonable assistance could include advice on suitable drop-off points, making transfer stations available as drop-off points, promotion by advocacy.

If the proposed collection scheme does not proceed then a once off, stand-alone collection, based on the proviso that there is an end disposal route for the collected containers i.e. plastics recycling company, may be worth investigating.