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A survey of current practice among farmers outwintering replacement dairy heifers in Great Britain

Research Partnership: Grasslands, Forage and Soil

Work Package 4: Outwintering as an alternative for replacement heifers reared for low or high input milk production systems

Report prepared for DairyCo

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AHDB Agriculture & Horticulture DEVELOPMENT BOARD

Harper Adams University

1.1 Key findings

Dairy farmers that outwinter replacement heifers do the following:

- Outwinter mainly to reduce the cost of rearing heifers and improve animal health and welfare
- Use grazed grass, kale or fodder beet, which is generally strip grazed and supplemented with big bales, straw or hay that is placed in the field prior to grazing.
- Choose free-draining soils to avoid poaching and run-off, and use a back fence. A grass run-back/headland area is also used to provide a dry lying area.
- Employ strategies for dealing with severe weather that include allocating an additional area and/or offering additional feed.
- House poor condition/underweight animals or outwinter these animals in a separate group.
- Utilise over 80% of the forage crop and achieve a live weight gain of approximately 0.6 kg/d, and a body condition score of 3.2 at calving.

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1.2 Executive summary

To determine best practice, a survey was posted to 120 farmers that were known to be, or have recently practiced outwintering of replacement heifers. The questionnaire was posted in April 2012, with a follow up sent to non-returnees at the end of April, and then again at the beginning of August 2012. Telephone calls were also made to non-returnees, and an online version of the questionnaire was publicised via Twitter and a Facebook discussion 'e-group' dedicated to outwintering cattle. By the close of the survey on 1 October 2012, a total of 70 usable questionnaires were returned (a return rate of 58%). Farm location ranged from the South West of Scotland to South West England, and 69% were spring calving. Questionnaire data was analysed using SPSS version 19. Summary characteristics of the farms are presented in Table S1.

Table S1. Characteristics of farms that are outwintering replacement dairy heifers in Great Britain (GB)

	Mean	Std. Dev.	Median	Min.	Max.
Herd size	368	206	325	35	1100
Milk yield (kg/cow)	5360	1498	5188	2700	9800
Replacement rate, %	20%	5%	20%	10%	35%
Heifers < 1 year old	69	92	36	0	500
Heifers > 1 year old	95	84	80	0	360

The major reason for outwintering was to reduce the cost of heifer rearing and improve animal health and welfare, which was rated on a scale of 1 (not important) to 5 (extremely important) as 4.56 and 4.06 respectively. Grass was the most common forage being used, grazed at an average pasture cover of 3284 kg DM/Ha. The most common forage crop was kale (with a mean yield of 10.0 t DM/Ha), followed by fodder beet (with a mean yield of 21.2 t DM/Ha), although fodder beet was less commonly grazed by heifers <1 year old. Strip grazing was the most popular means of utilising outwintering forages, being employed on 70% of farms. Big bales were the most common supplementary feed, used on over 80% of farms, and were stored in the field on the majority of farms. The wastage of supplementary feeds was regarded as low at an average 12%, but ranged from 0 to 50%. Mineral boluses were used on 49% of farms, whilst 20% used no supplementary minerals. Strategies for dealing with severe weather for outwintered heifers included allocating an additional area (43%) and/or offering additional feed (41%), although 40% of farmers did not consider that they needed to alter their management due to the weather. Housing of poor condition/underweight animals was conducted on 54% of farms, whilst 35% outwintered these animals in a separate group. Fields with free draining soils and the use of a back-fence, along with a grass run-back/headland area stand-off area were viewed as the major factors to avoid poaching, whilst free draining soils and avoiding steep fields were the most important to avoid run-off. Nearly 75% of farms ploughed the fields following outwintering, with grass subsequently being sown by 70%. The prime benefit of outwintering was to increase overall profit, and the economics of outwintering was the aspect that the majority of farmers wished to see more research on, although several other areas were also considered very important.

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2. Background

With the trend towards increasing dairy herd size (DairyCo, 2012) as a means of cost effective milk production, comes increasing pressure on buildings to accommodate the cattle. Options to facilitate increasing numbers of cattle in the milking herd include construction of dedicated additional heifer replacement buildings, woodchip pads (McCarrick and Drennan, 1972; Boyle et al., 2008) or purchasing down-calving replacement heifers (which may have biosecurity issues). Another alternative to permit dairy herd expansion without the need for major capital investment is to outwinter replacement heifers. These low capital systems have the potential to decrease rearing costs by reducing housing, bedding and feed costs. Replacement heifers can be outwintered as peri-pubertal (during their first winter) and in-calf heifers, to calve for the first time after their second winter outside.

Previous studies (Redbo et al., 2001; Morgan et al., 2009; O'Driscoll et al., 2010) suggest that cattle adapt well to cold climatic conditions provided that they are kept on free draining soils with shelter available to protect the animals from the wind, and a dry lying area. If ambient temperatures drop below the lower critical temperature of the cattle they have been shown to adapt their behaviour and location to reduce energy expenditure (Redbo et al., 2001; Morgan et al., 2009). Some studies have shown a reduction in the growth of heifers through the winter period, particularly with autumn-born heifers (Ridler and Broster 1968), although others have shown no detrimental effect (Redbo et al., 1996; Marsh et al., 2009). Performance on farm appears to be related to a number of variables including feed source and allowance, health, shelter and lying conditions. Evidence also suggests that there will be little effect on subsequent lactation performance in heifers reared to calve at 30 to 35 months of age (Ridler and Broster 1968), although less information is available for animals managed to calve at 24 months.

2.1 Objectives

To survey dairy farms that are currently or have recently outwintered replacement heifers to determine current practice with a view to transferring this information to farmers.

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3. Materials and methods

3.1 Data collection

A list of 120 farms outwintering replacement dairy heifers was compiled over the winter of 2011/2012. The names were gathered from DairyCo extension officers, members of pasture based discussion groups and grazing societies, companies supplying the dairy industry dealing with farms likely to outwinter heifers, and those known to Harper Adams University College and Scottish Agricultural College.

A provisional version of the questionnaire was posted to a pilot group of seven farmers outwintering heifers. These farmers, five of which attended, were invited to a focus group to discuss and improve the questionnaire design. Advice on the final questionnaire was also received from DairyCo.

The final questionnaire was posted to the 120 farms in April 2012. Included with the questionnaire was a letter introducing the research and a free post, self-addressed envelope. Additional questionnaires were sent out in April and August to non-respondents. In addition to the paper questionnaire, an online version was prepared and publicised via Twitter and a Facebook discussion 'e-group' dedicated to outwintering cattle. The survey closed on 1 October 2012.

3.2 Data analysis

Farmers were given the option to present body condition score on the New Zealand or United Kingdom scale; values in the New Zealand scale were converted to the UK scale using the formula 0.81 + 0.4 x New Zealand score (Bewley et al, 2008). Data was input into SPSS version 19 for analysing mean, standard deviation, maximum, minimum, median and mode. Data were also categorized into farms that were expanding or not, and differences between the groups analysed.

4. Results

4.1. Farm location

Of the 120 posted 70 usable questionnaires were returned by the close of the survey, representing a return rate of 58%. The mean number of years of experience outwintering on these farms was 9.7, ranging from one to 40 years. The geographical distribution of the farms is shown in Figs. 1 and 2, with farms grouped into first level Nomenclature of Territorial Units for Statistics (NUTS) regions of the European Union (Anon, 2007). The greatest number of questionnaires was returned from dairy farmers in the South West of England, followed by the West-Midlands, which combined contributed 57% of all returns.

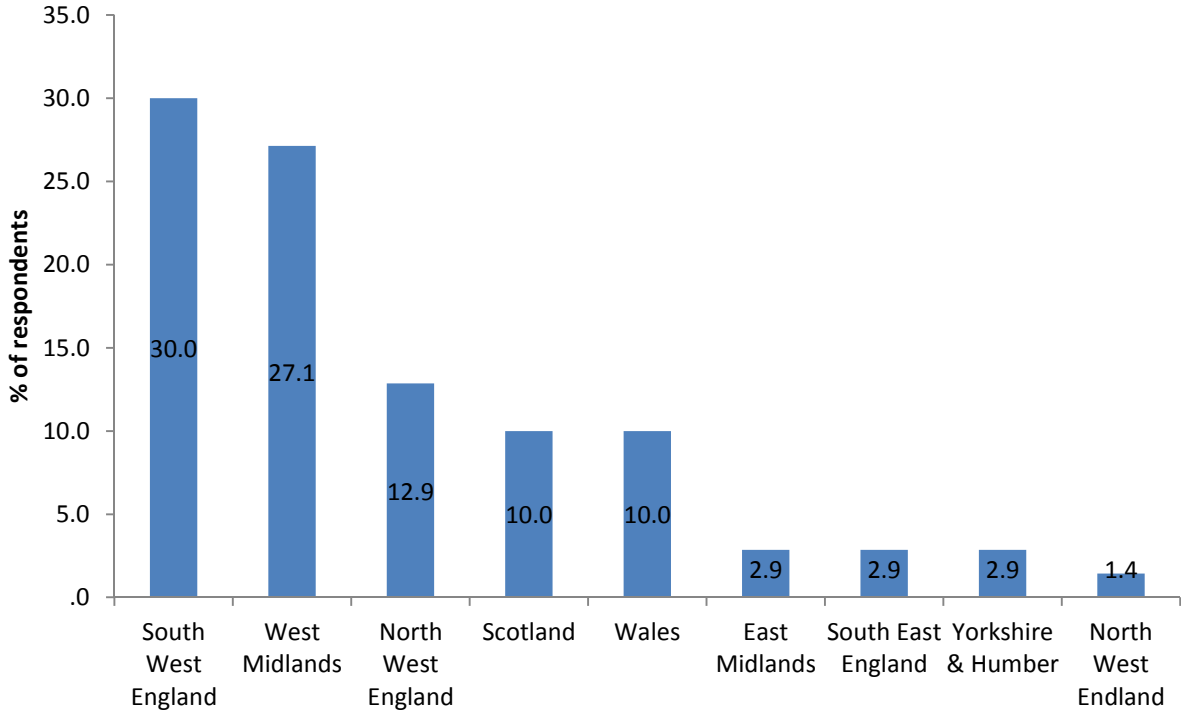

Figure 1. Geographical distribution by region of farmers who are outwintering replacement dairy heifers GB

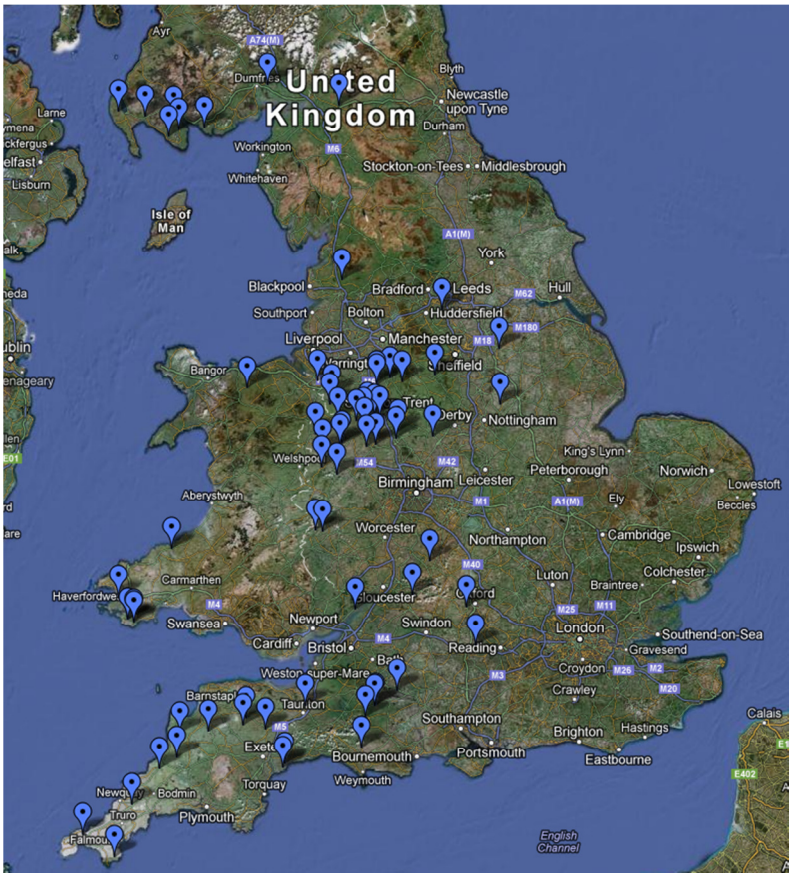

Figure 2. Geographical distribution of farmers who are outwintering replacement dairy heifers in GB

4.2 Farm characteristics

Herd size (excluding replacement heifers) ranged from 35 to 1100 cows (Table 1), with mean and mode value of 368 and 325 respectively. These values are considerably highert than the UK average of 123 cows per herd (DairyCo. 2012) The most common breed among the respondents was cross-bred, making up 53% of cows, with 39% Holstein Friesian, 7% Jersey, and the remaining 1% of cows made up of Shorthorn Ayrshire, Guernsey, Montbeliarde and Brown Swiss. The mean and median milk yield was 5360 and 5188 litres/annum, ranging from 2700 to 9800, with a mean fat and protein percentage of 4.52 and 3.53 respectively. Cow live weight ranged from 400 to 700 kg, with a mean value of 527 kg. Average replacement rate was 20%, ranging from to 10 to 35%. In relation to the replacement heifers, average live weight at first service was calculated to be 59.8% of mature weight, and weight at calving 87.8% of mature weight. Average live weight gain of the replacement heifers was reported to be 0.54 kg/d between first service and calving, ranging from 0.11 to 1.24 kg/d. Calving pattern on the majority of farms (69%) was seasonal spring (Fig. 3). Milk production systems which produce milk all year (split spring/autumn block calving and all year round calving herds), made up 28% of respondents.

When asked about herd expansion, 63% of respondents replied that they were increasing herd size (Table 2). This pattern in response was confirmed with mean herd size increasing from 315 in 2009/2010, to 368 in 2011/2012; an increase of 53 cows over two years. Farms that indicated they were expanding herd size increased an average of 12% per year between 2009 and 2012 (Table 3). This appeared to arise largely from rearing extra replacement heifers (Table 4). Both expanding and not expanding herds reared heifers in excess of their replacement rate requirements (29% and 25% respectively).

Table 1. Characteristics of dairy farms outwintering replacement dairy heifers in GB

	Number of respondents	Mean	Std.Dev.	Median	Min.	Max.
Herd size	67	368	206	325	35	1100
Milk yield (litres)	68	5360	1498	5188	2700	9800
Milk fat %	66	4.52	0.42	4.49	3.80	6.00
Milk protein %	66	3.53	0.20	3.54	3.16	4.00
Milk SCC[1]	66	180	47	180	100	300
Cow live weight (kg)	70	527	62	513	400	700
% Replacement rate	68	20%	5%	20%	10%	35%
Heifer lwt[2] at 1st service (kg)	61	316	55	300	250	540
Heifer lwt at calving (kg)	62	459	62	450	300	700
Average lwt gain (kg/d)[3]	56	0.54	0.17	0.57	0.11	1.24

[1] Somatic cell count [2]lwt = live weight [3]Between 1st service and calving

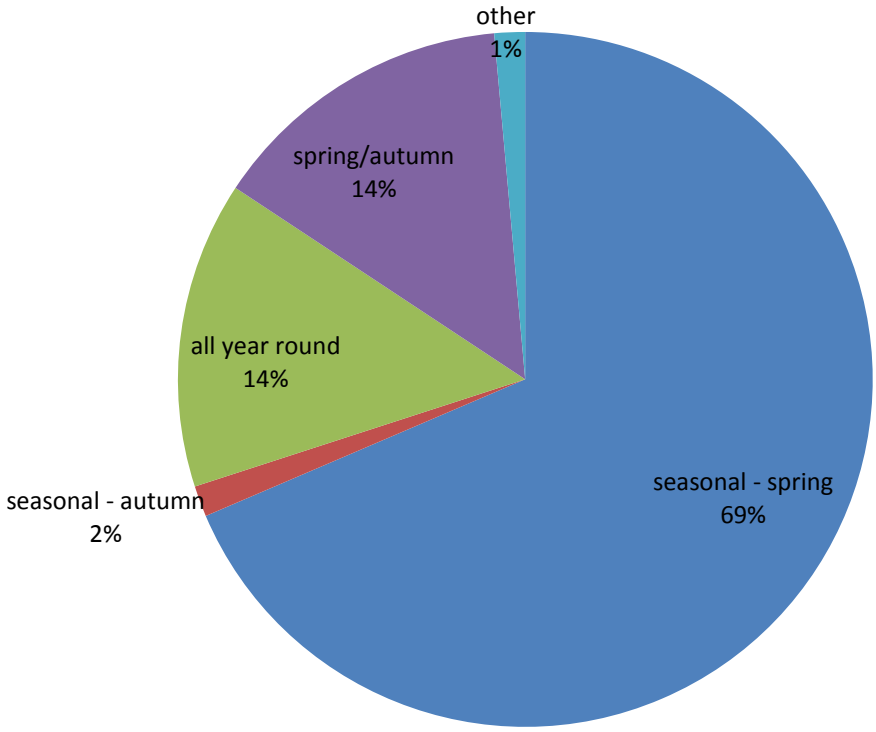

Figure 3. Calving pattern of dairy farms outwintering replacement dairy heifers in GB

Table 2. Herd size of dairy farms that outwinter replacement dairy heifers in GB and are either expanding on not expanding herd size

	Response	Respondents	Mean	Std. Dev	Median	Min.	Max.
2009/2010	Expanding	42	289	148	300	0	600
	Not expanding	23	362	233	250	160	1100
	All	67	315	184	300	0	1100
2010/2011	Expanding	42	327	174	325	40	900
	Not expanding	23	372	232	270	170	1100
	All	67	343	197	300	40	1100
2011/2012	Expanding	42	364	193	360	35	1000
	Not expanding	23	378	233	300	170	1100
	All	67	368	206	325	35	1100

Table 3. Average yearly increase in herd size of dairy farms outwintering replacement dairy heifers in GB

	Number of respondents	Mean	Std.Dev.	Median	Min.	Max.
Expanding herds	40	12%	16%	8%	-11%	81%
Not expanding	23	2%	6%	1%	-1%	25%

Table 4. Heifers reared in excess of replacement rate requirements[1] on dairy farms outwintering replacement dairy heifers in GB

	Number of respondents	Mean	Std.Dev.	Median	Min.	Max.
Expanding herds	40	29%	28%	30%	-50%	75%
Not expanding	22	25%	25%	31%	-40%	67%

[1]Calculated as the number of heifers reared as a percentage of the number required from the stated herd size and replacement rate

4.3 Winter soil and climate conditions

When questioned about the soil drainage characteristics of outwintering fields, the majority of farmers rated their soil as free draining; with only 2.9% rating it as poorly drained (Fig 4). In relation to soil type, when asked what percentage of the outwintering area was light, medium or heavy soil; the mean for light soils was 46% with farms ranging from 0% to 100%; the mean for medium soil was 41% with farms ranging from 0% to 100%; and the mean for heavy soil was 14% with farms ranging from 0% to 100%.

When asked to classify the farms winter climate, 26% of respondents considered that they usually had a cold and wet climate, 10% cold and dry, 53% mild and wet, 11% mild and dry (Fig 5.). In summary, 64% had mild winters and 36% cold winters, with 21% having dry winters and 79 % wet winters.

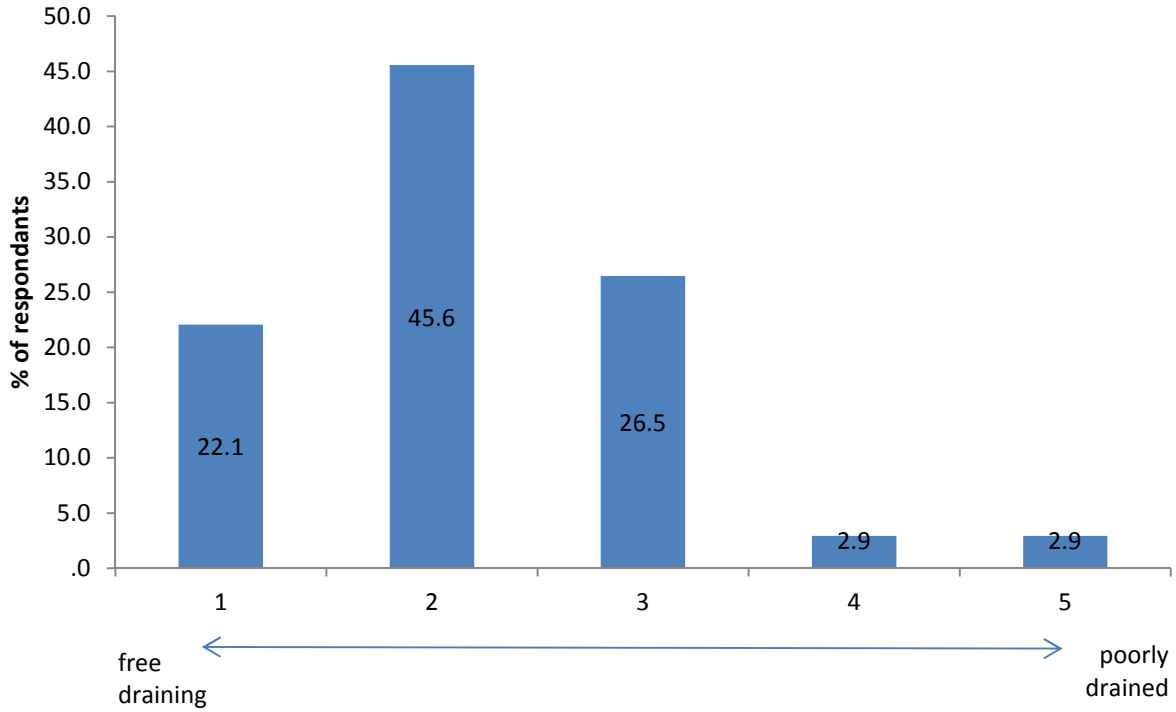

Figure 4. Level of drainage on fields used for outwintering replacement dairy heifers in GB

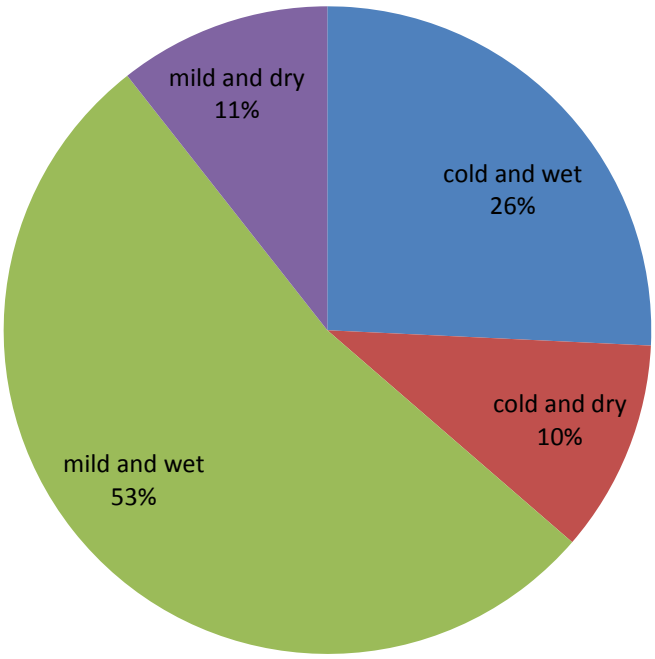

Figure 5. Winter climate classification of farmers outwintering replacement dairy heifers in GB

The length of the winter period ranged from 2 – 6 months, with a mean length of 3.8 months and median of 4 months (Table 5). It was most common for heifers to be outwintered for the entire winter on each individual farm with the mean outwintering period of 96% and 95% of the winter for heifers <1 year and heifers >1 year respectively. The majority of farmers considered Nov, Dec, Jan and Feb, with only 26% considering March and 10% October as winter (Fig 6).

Table 5. Length of outwintering period on farms outwintering replacement dairy heifers in GB

	Number of respondents	Mean	Std. Dev	Mode	Min.	Max.
Length of winter (months)	70	3.8	1.0	4	2	6

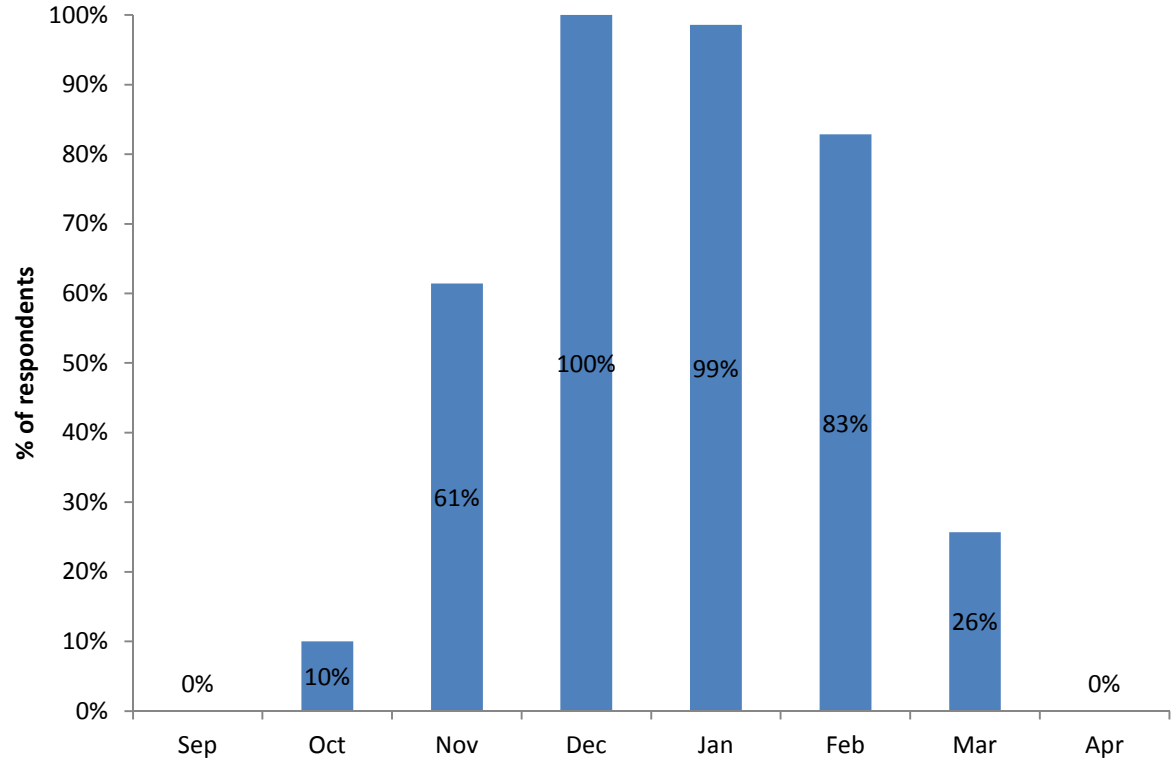

Figure 6. Months which are considered winter by farmers outwintering replacement dairy heifers in GB

4.4. Number of replacement heifers outwintered

The number of heifers <1 year old which were outwintered in 2011/2012, ranged from 0 to 500, with a mean of 69 (Table 6). The number of heifers outwintered in this class increased from 49 in 2009/2010 to 60 in 2010/2011. The number of heifers >1 year old which were outwintered, ranged from 0 to 360 in the winter of 2011/2012 with a mean of 95 (Table 7). The number of heifers >1 year old has remained relatively constant in the last 3 years, with a mean of 87 in 2009/2010 and 95 in 2011/2012.

Of the farms surveyed, 60% were outwintering heifers <1 year old, and 89% outwintering heifers >1 year old. The mean percentage of heifers <1 year old outwintered was 58%. With regard to heifers >1 year old, the mean percentage of in-calf heifers outwintered was 89% and non-pregnant heifers outwintered 65%.

Table 6. Number of replacement dairy heifers per farm <1 year old outwintered in GB

	Number of respondents	Mean	Std.Dev	Median	Min.	Max.
2009/2010	69	49	64	26	0	250
2010/2011	68	60	72	33	0	275
2011/2012	70	69	92	36	0	500

Table 7. Number of replacement dairy heifers per farm >1 year old outwintered in GB

	Number of respondents	Mean	Std.Dev	Median	Min.	Max.
2009/2010	67	87	92	60	0	500
2010/2011	67	88	91	60	0	500
2011/2012	69	95	84	80	0	360

4.5 Reasons for outwintering replacement heifers

When asked to rank the reasons for outwintering replacement heifers in terms of their importance on a Likert scale (1 – not important, 2 – slightly important, 3 – moderately important, 4 – very important, 5 – extremely important and 6 – don't know), the most important reason was to reduce the cost of outwintering, with a mean score of 4.56, followed by improvements to animal welfare and to reduce labour input (Table 8a). The least important reasons were to improve animal growth over the winter and to improve crop rotation, with mean scores of 2.79 and 2.25 respectively.

Table 8a. Reasons for outwintering by farmers outwintering replacement dairy heifers in GB[1]

	Number of respondents	Mean score	Std.Dev	Mode score
Reduce the cost of heifer rearing	70	4.56	0.79	5
Improve animal health and welfare	69	4.06	0.94	4
Reduce labour input	69	3.74	1.15	5
Alleviate pressure on buildings	67	3.67	1.43	5
Improve summer growth at grass	67	3.12	1.41	4
Expansion of cow numbers	70	3.11	1.55	1
Improve winter animal growth	68	2.79	1.33	3
Improve crop rotation	67	2.25	1.28	1

[1]as rated on a five point Likert scale (1 not important, 2 slightly important, 3 moderately important, 4 very important, 5 extremely important)

When the reasons for outwintering were analysed in relation to whether the herd was expanding or not then there were was a similar ranking of reasons for outwintering on both types of herd, except for "Expansion of cow numbers", which ranked higher ($P < 0.001$) in herds that were increasing in herd size (Table 8b).

Table 8b. Reasons for outwintering by farmers on farms either expanding or not expanding and outwintering replacement dairy heifers in GB[1]

	Expanding herds		Not expanding		
	Mean score	Std.Dev	Mean score	Std.Dev	Sig.
Reduce the cost of heifer rearing	4.56	0.81	4.52	0.79	n.s
Improve animal health and welfare	4.02	0.98	4.04	0.88	n.s
Reduce labour input	3.59	1.11	3.96	1.22	n.s
Alleviate pressure on buildings	3.72	1.30	3.68	1.64	n.s
Improve summer growth at grass	3.33	1.30	2.64	1.56	n.s
Expansion of cow numbers	3.56	1.44	2.13	1.32	<0.001
Improve winter animal growth	2.86	1.27	2.55	1.47	n.s
Improve crop rotation	2.53	1.30	1.64	1.05	0.004

[1]as rated on a five point Likert scale (1 not important, 2 slightly important, 3 moderately important, 4 very important, 5 extremely important)

4.6 Field selection and management

When asked to rank the criteria for selecting outwintering fields in terms of their importance on a Likert scale (1 – not important, 2 – slightly important, 3 – moderately important, 4 – very important, 5 – extremely important and 6 – don't know), the most important reason was 'Type of soil', with a mean score of 3.65, followed by 'fields due to be reseeded/cropped' (Table 9). The least important criteria was to have fields close to farm buildings, with a mean score of 1.40. The majority of farmers surveyed (76%) felt that this criteria was not important.

Table 9. Criteria for selecting outwintering fields by farmers outwintering replacement dairy heifers in GB[1]

	Number of respondents	Mean score	Std. Dev	Mode score	Min. score	Max. score
Type of soil	69	3.65	1.19	3	1	5
Fields due to be reseeded/cropped	69	3.14	1.34	3	1	5
Access/perception of public	69	2.86	1.35	3	1	5
Natural shelter (e.g. hedges)	70	2.73	1.32	3	1	5
Fields close to farm buildings	70	1.40	0.82	1	1	5

[1]as rated on a five point Likert scale (1 not important, 2 slightly important, 3 moderately important, 4 very important, 5 extremely important)

The most common steps taken to avoid poaching were using a free draining field and a back fence, with 64% and 67% of the farmers taking these steps respectively (Fig. 7). This was followed by the use of a stand-off area (27%). Low stocking rate and low crop utilisation were not commonly used to avoid poaching, with 14% and 1% of farms respectivelyreporting these. Other measures included providing a fresh area daily or every 12 hours, using movable water troughs, grazing wet areas in dry weather and sub-soiling heavy fields.

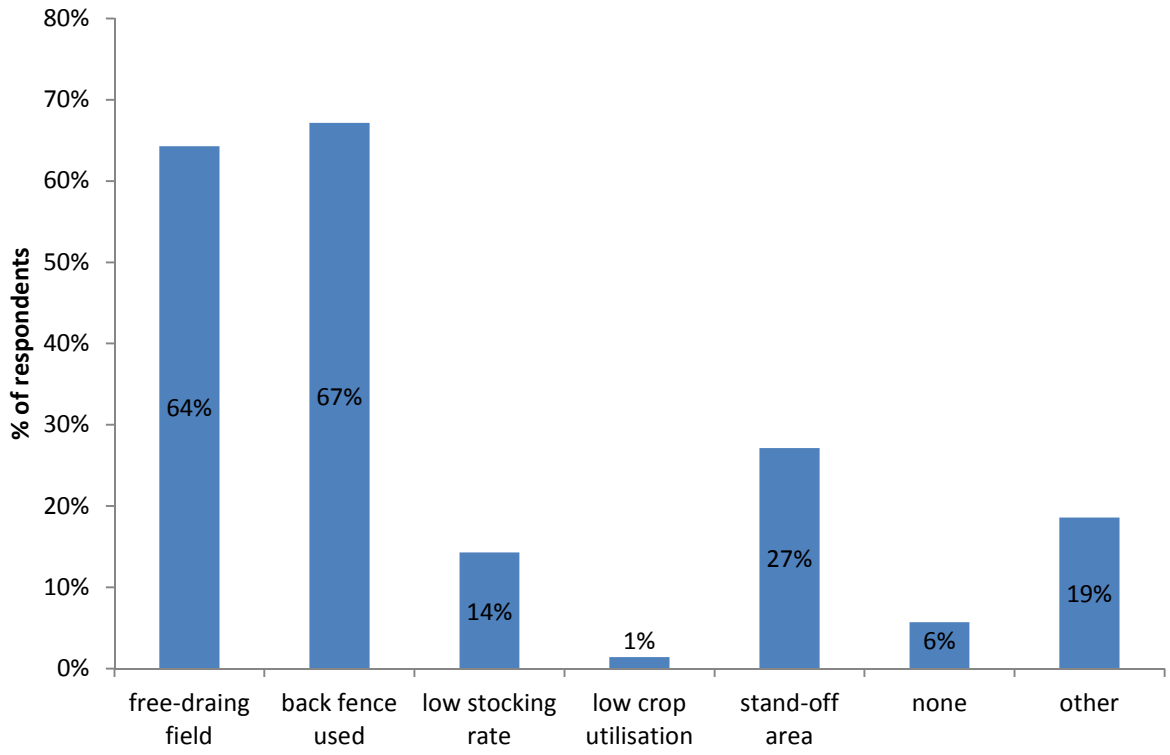

Figure 7. Steps taken to avoid poaching fields outwintering replacement dairy heifers in GB

Use of a free draining field was also the most common measure to avoid run-off from outwintering fields, with 62% of respondents taking this step (Fig. 8). The next most popular steps were avoiding steep fields and having a buffer strip. Ploughing was a method used by 16% of respondents, but reducing the utilisation of the grazed crop was not employed by any of the farmers. Other measures included sub-soiling, starting grazing from the top of a slope and working down, and moving fences and fields in a timely manner.

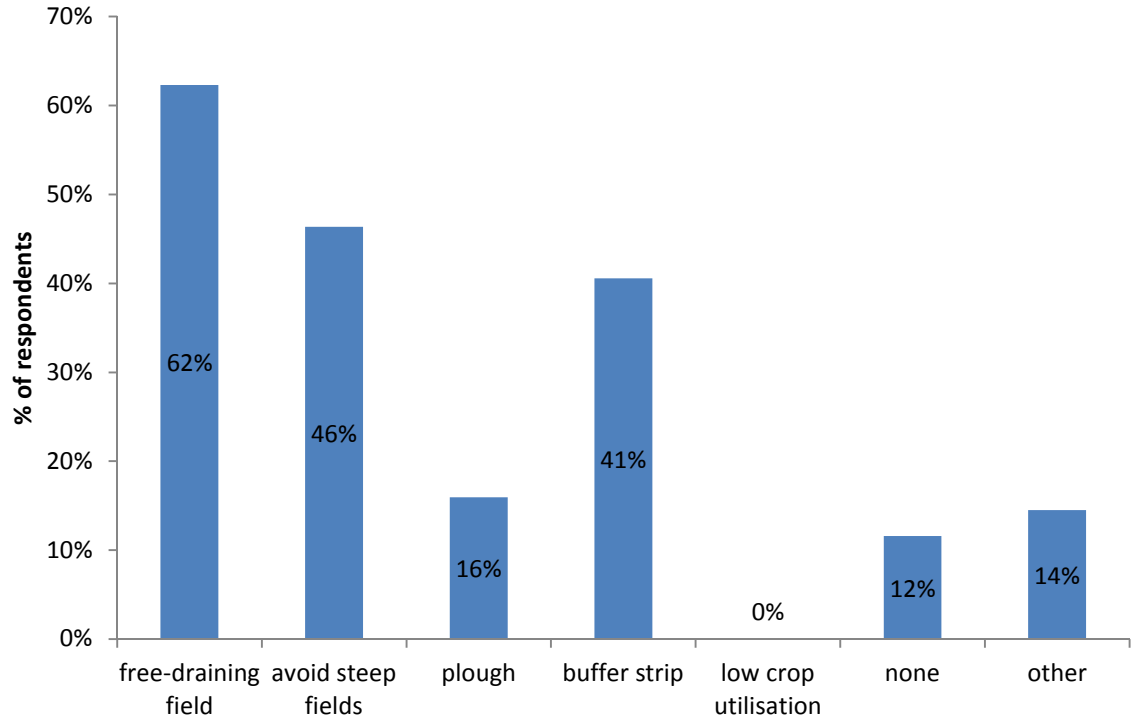

Figure 8. Steps taken to avoid run-off from fields outwintering replacement dairy heifers in GB

Field selection and having grass run-back/headland areas, were the most used tools for providing a dry lying area for outwintered heifers with 57% and 47% of respondents respectively using these management techniques, followed by crop choice, straw bedding and a wet weather stand-off (Fig. 9). Other steps included providing a fresh area every 24 or 12 hours, sub-soiling and woodchip pads. No particular steps to provide a dry lying area were considered necessary by 10% of respondents.

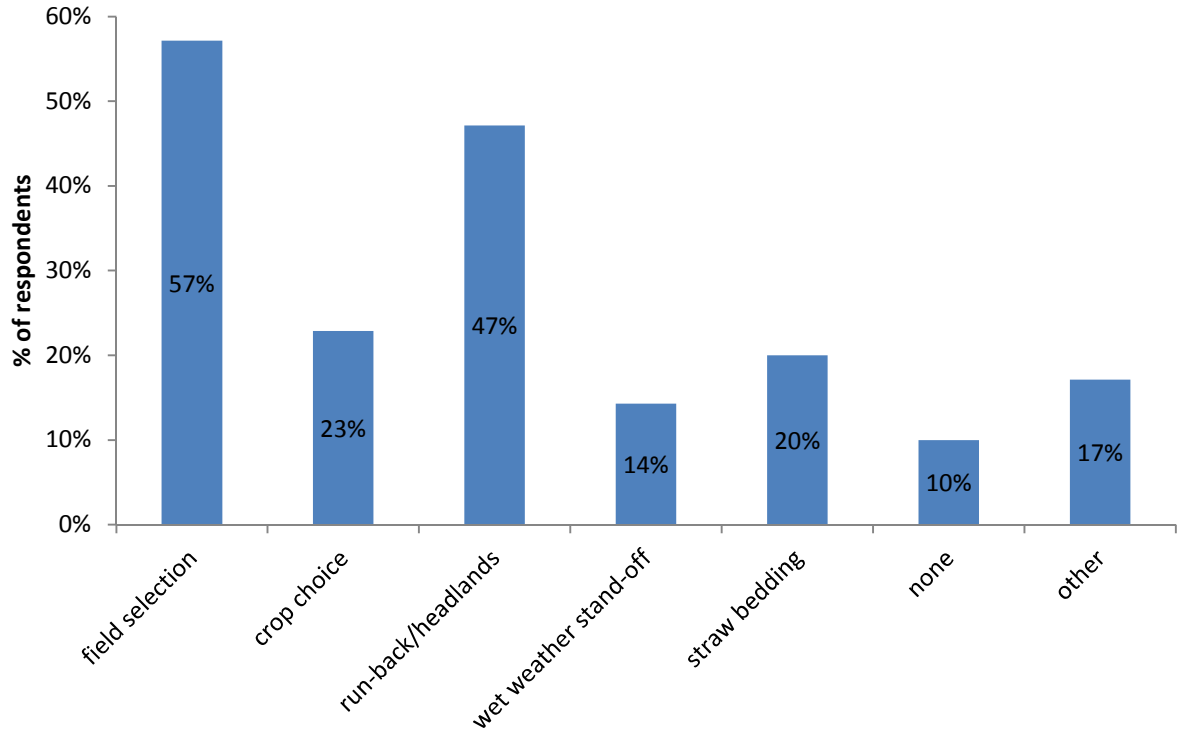

Figure 9. Steps taken to provide a dry lying area on fields outwintering replacement dairy heifers in GB

Ploughing was the most common practice following outwintering, with 74% of farms doing this (Fig. 10). The next most common response was sub-soiling and tilling the fields with 40% and 33% respectively. Other measures included over seeding damaged areas (e.g. around bale feeders). The most common crop to follow the outwintering period was grass at 70% (Fig. 11). Responses for "Others" were most commonly a second outwintering crop (18.6%) and this, together with cereals and maize, made up the rest.

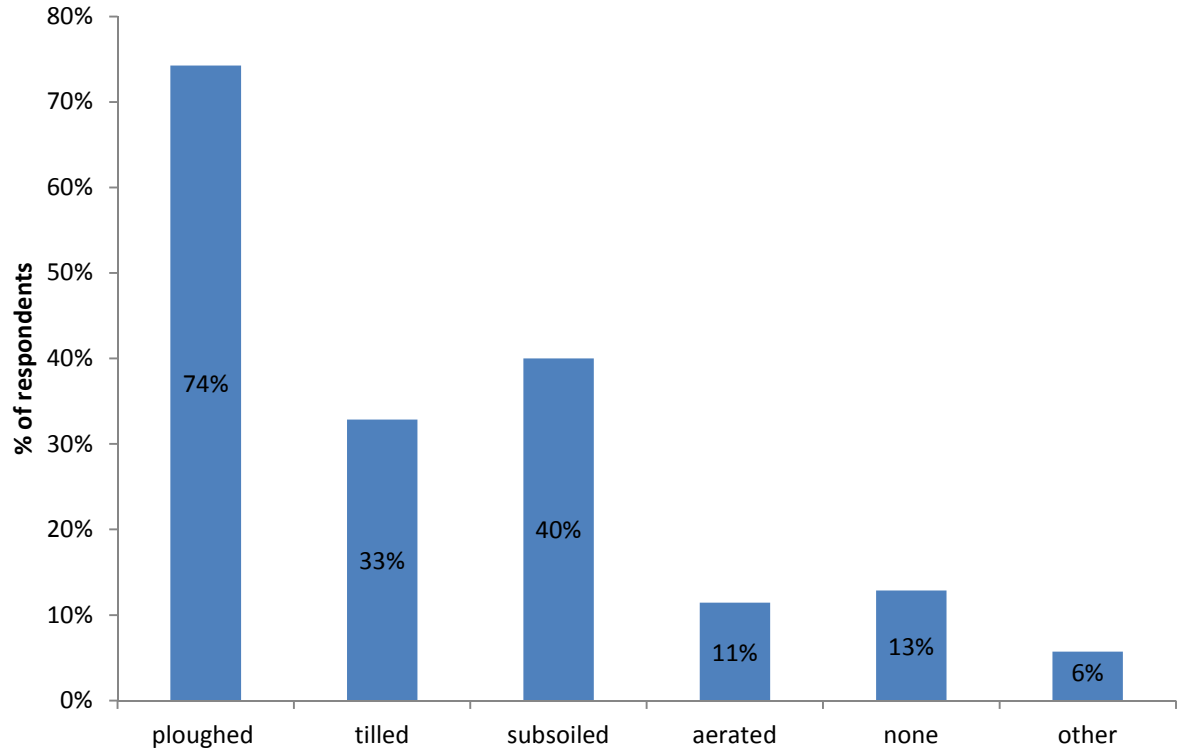

Figure 10. Post winter management of fields outwintering replacement dairy heifers in GB

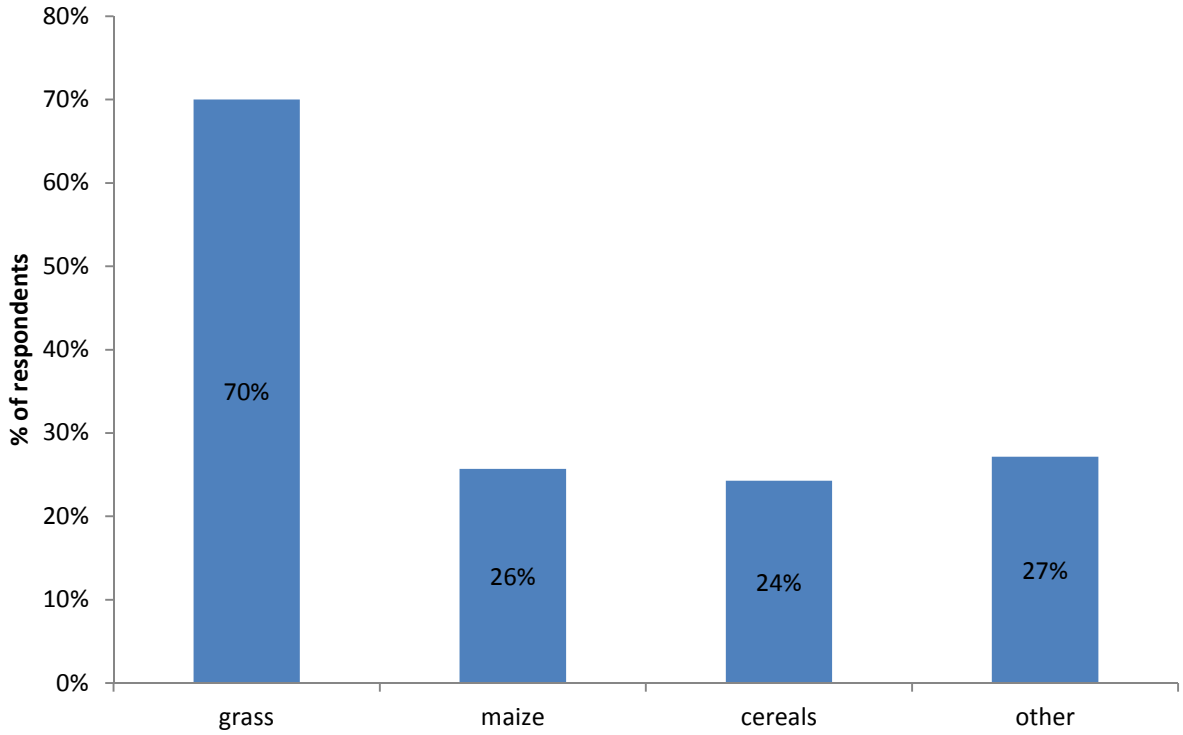

Figure 11. Subsequent year crop on fields outwintering replacement dairy heifers in GB

4.7 Outwintering forage and management

The most common forage for outwintering heifers of all ages was grazed grass (Fig. 12). Of the crops sown for the purpose of outwintering, kale was the most common for all ages of heifer, followed by hybrids (e.g. Swift), stubble turnips and fodder beet for heifers <1 year old. Although less common with younger heifers, fodder beet was the third most popular outwintering forage for heifers >1 year old. This was followed by hybrids and stubble turnips. Swedes were not commonly grown to feed outwintered heifers.

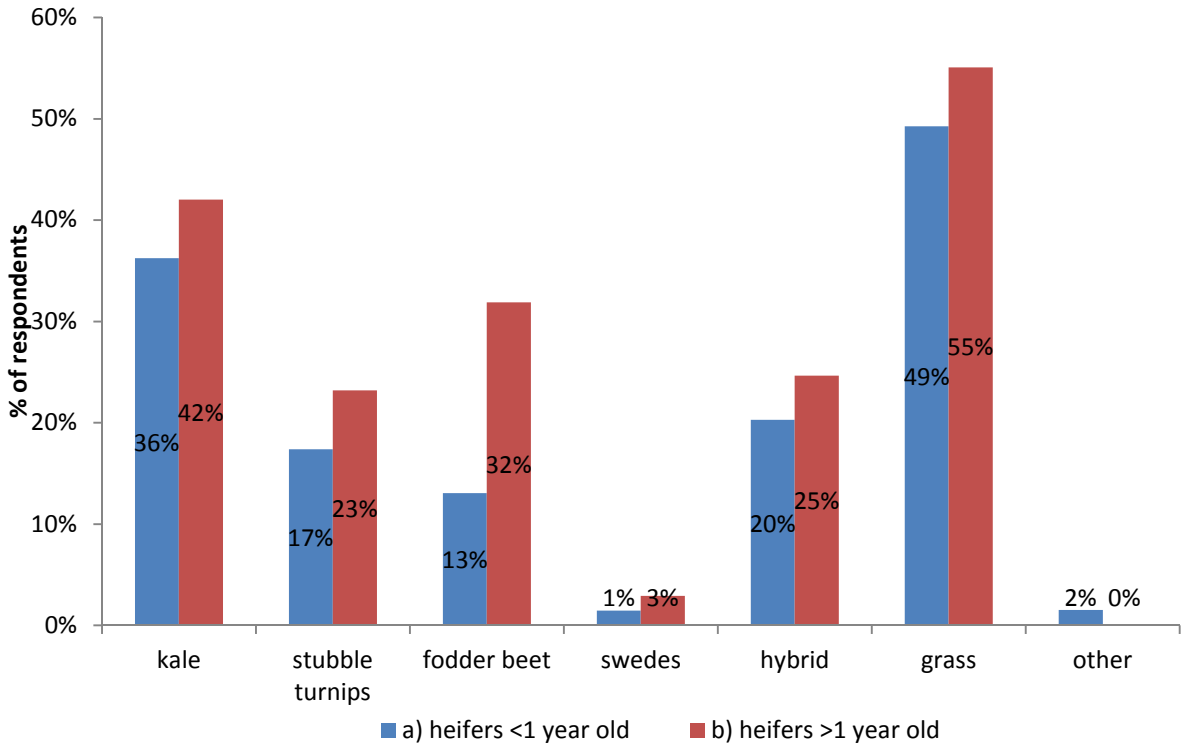

Figure 12. Forage crops used for outwintering replacement dairy heifers in GB

The yield of outwintering crops was measured by 47% of the farms surveyed. Data for the yield of the four most common fodder crops is presented in Table 10 and pasture in Table 11.

Table 10. Yield of forage crops (t DM/Ha) on dairy farms outwintering replacement dairy heifers in GB

	Number of respondents	Mean	Std.Dev.	Median	Min.	Max.
Kale	8	10.0	3.0	9.4	7.0	16.5
Stubble turnips	4	4.4	0.6	4.5	3.5	5.0
Fodder beet	16	21.2	5.3	20.0	14.0	30.0
Hybrid	2	4.8	0.4	4.8	4.5	5.0

Table 11. Average pre and post grazing pasture covers (t DM/Ha) of fields outwintering replacement dairy heifers in GB

	Number of respondents	Mean	Std.Dev.	Median	Min.	Max.
Pre grazing kg DM/Ha	41	3284	548	3250	2000	4500
Post grazing kg DM/Ha	39	1446	211	1500	1000	2200

Quantities of forage offered to each age group in kg of dry matter per head per day, are presented in Table 12. Heifers older than 1 year old were offered approximately twice as much forage per day as those under 1 year old. Aside from allocating on kg DM/head/day, heifers were sometimes fed on an 'ad lib', 'to hunger', 'until waste appears' basis, or had an area of crop allocated based on the number of days feeding required, and were buffer fed with supplementary feed.

Table 12. Average quantity of forage offered to outwintering replacement dairy heifers in GB (kg DM/head/d)

	Number of respondents	Mean	Std.Dev	Median	Min.	Max.
Heifers < 1 year old	17	4.68	1.97	4.00	2.00	10.00
Heifers > 1 year old	38	9.08	5.23	8.00	2.00	28.00

Farmer's opinions regarding the average percentage of the crop utilised for each age group is presented in Table 13. Mean utilisation for heifers younger and older than one year, was 82% and 83% respectively. Some farmers stated that 100% of the crop was utilised.

Table 13. Farmer opinion of percent of forage crops utilised by outwintering replacement dairy heifers in GB

	Number of respondents	Mean	Std.Dev	Median	Min.	Max.
% crop utilisation for heifers <1 year old	45	82%	12%	80%	25%	100%
% crop utilisation for heifers >1 year old	60	83%	10%	80%	60%	100%

Strip grazing was most commonly used when feeding the crop (Fig. 13), with 70% of respondents employing this technique at some point. This was followed by 'block grazing' at 32%. Farmers outwintering on grazed pasture were most likely to block graze, with 42% of this group indicating that they used this method, although strip grazing was still more common at 58%. Paddock grazing and on-off grazing were not common techniques for outwintering heifers.

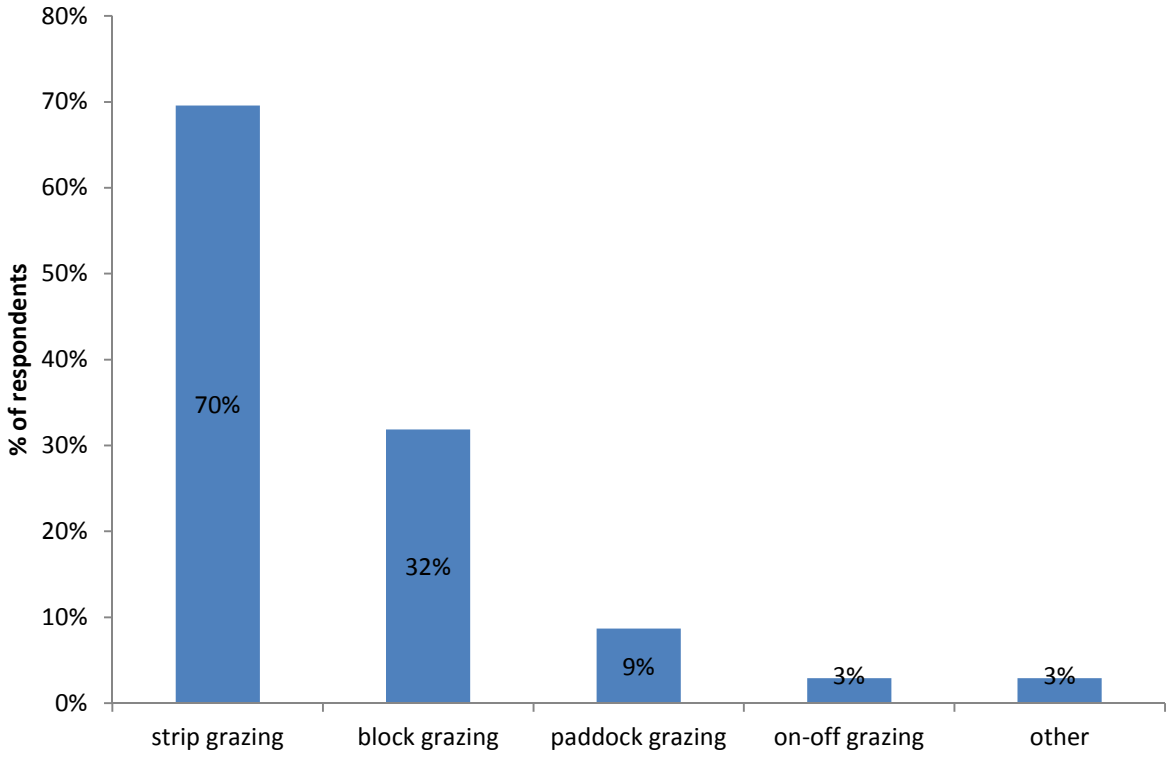

Figure 13. Crop feeding management of fields outwintering replacement dairy heifers in GB

4.8 Supplementary feeding and management

Of the supplements offered to outwintering heifers, big bale grass silage was used on 83% of farms for heifers <1 year old, and 87% for heifers >1 year old (Fig. 14). The next most popular supplement for heifers <1 year old was concentrates (12%) followed by hay (10%). Straw was not commonly used with this group of heifers (2%). In contrast, for heifers >1 year old, straw was the second most popular (26%), followed by hay (18%) and concentrates (13%), although big bale silage was still the most popular On average, heifers under 1 year old were offered 3.4 kg DM/hd/d of supplementary feed and those over 1 year 4.5 kg DM/hd/d (Table 14). Of the farmers who reported both the quantity of forage and supplementary feed allowance, 44% of the diet was estimated to be supplementary feed for heifers less than 1 year old, and 35% of the diet for heifers over 1 year (Table 15). Farmers estimated that on average, 12% of supplementary feed was wasted, ranging from 0 to 50% (Table 16).

Table 14. Average quantity of supplement offered to outwintering replacement dairy heifers in GB (kg DM/head/d)

	Number of respondents	Mean	Std.Dev	Median	Min.	Max.
Heifers < 1 year old	31	3.39	2.87	3.00	1.00	17.00
Heifers > 1 year old	42	4.47	2.61	4.00	0.25	13.00

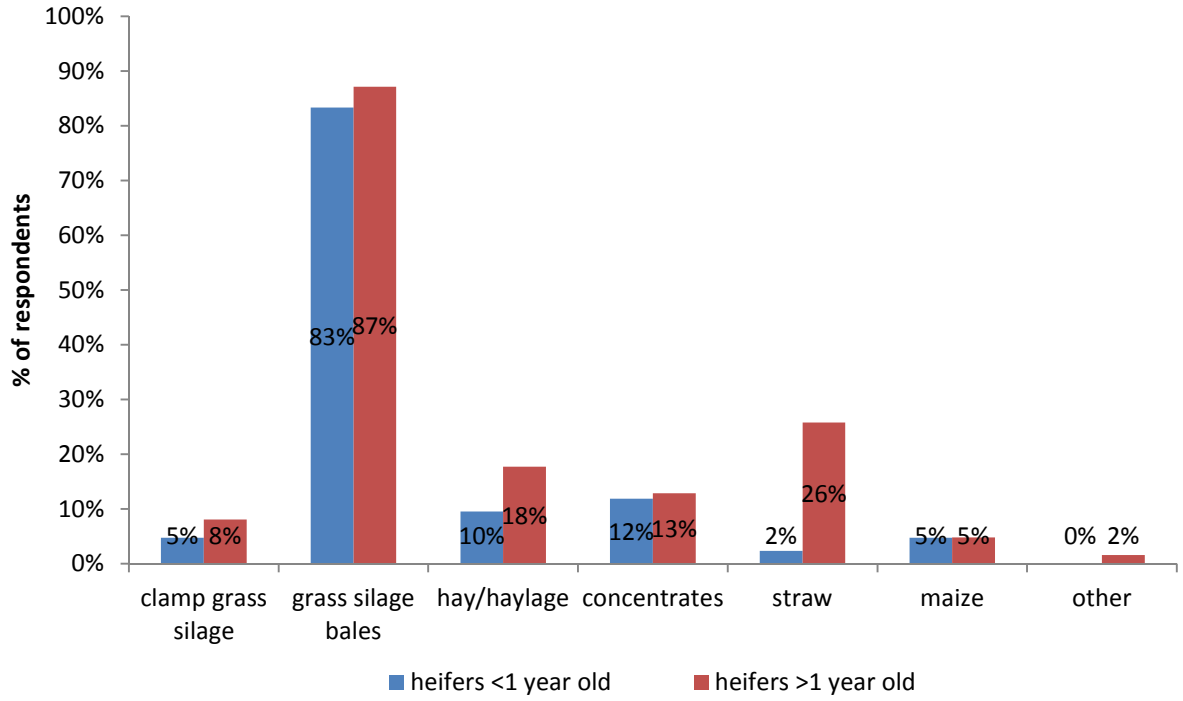

Figure 14. Supplementary feeds used in outwintering replacement dairy heifers in GB

Table 15. Percent of total diet offered as supplementary feed to outwintering replacement dairy heifers in GB

	Number of respondents	Mean	Std.Dev.	Median	Min.	Max.
Percent offered to heifers <1 year old	12	44%	12%	41%	33%	75%
Percent offered to heifers >1 year old	29	35%	19%	33%	5%	80%

Table 16. Farmer opinion of the percent of supplementary feed wasted by outwintering replacement dairy heifers in GB

	Number of respondents	Mean	Std.Dev.	Median	Min.	Max.
% wasted	65	12%	12%	10%	0%	50%

The majority of the supplementary feed was stored in the field, with 66% using this method, followed by daily deliver at 26% and delivered weekly at 12% (Fig. 15). The most popular means of feeding was using a ring feeder (52% of responses) followed by feeding on the ground (39% of responses; Fig. 16).

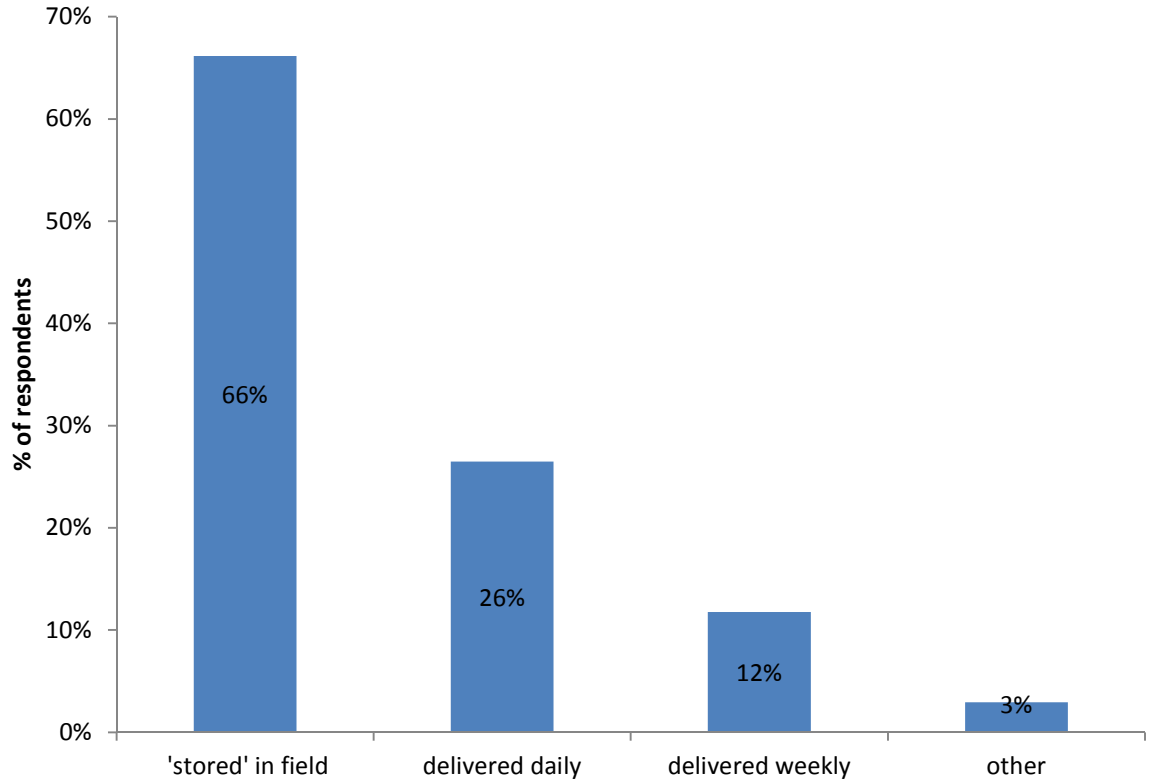

Figure 15. Means of delivering supplementary feed to outwintering replacement dairy heifers in GB

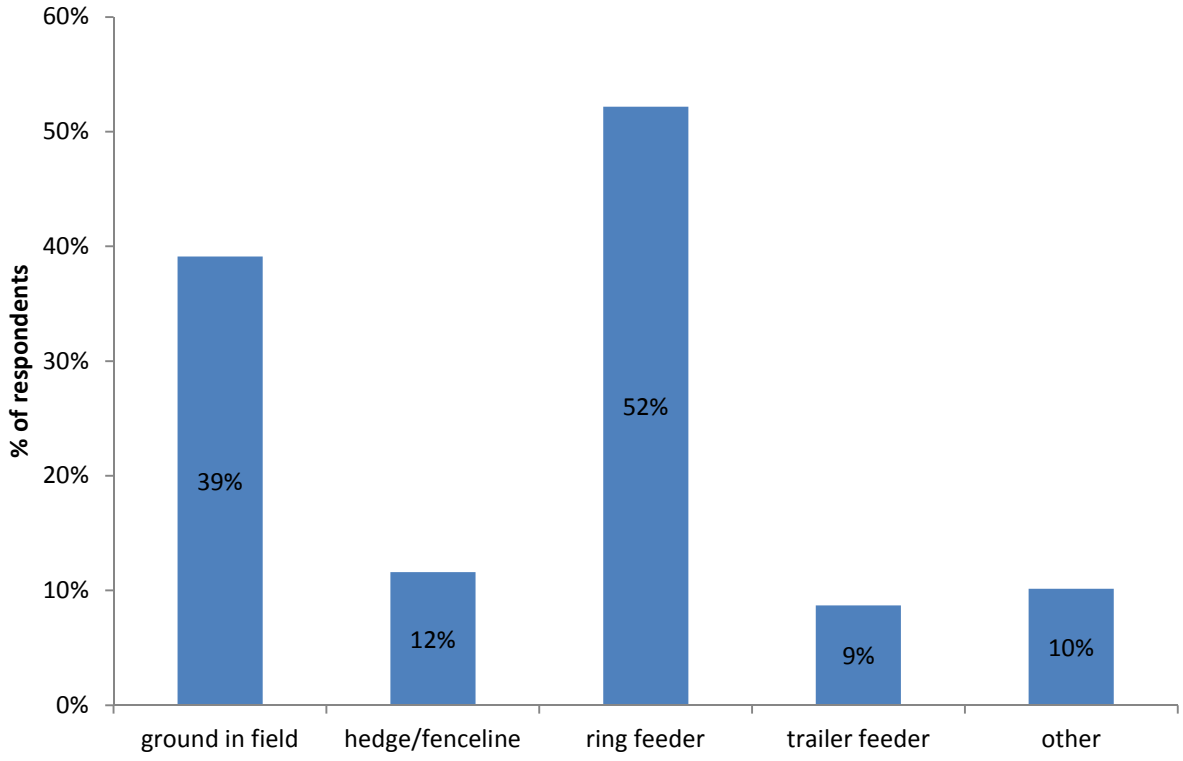

Figure 16. Method of offering supplementary feed to outwintering replacement dairy heifers in GB

4.9 Mineral supplements and worming

A mineral bolus was the most popular means of providing supplementary minerals, being used on 49% of farms, with 23% using a lick block and 20% using no mineral supplement (Fig. 17). Others forms of mineral supplementation included; added to water, sea weed and iodised salt. Pour on wormers were the most popular means of controlling internal and external parasites making up 31% of responses, followed by drenching at 27% and injection at 21% (Fig. 18). One-third (33%) of respondents used no form of worm control over the winter period.

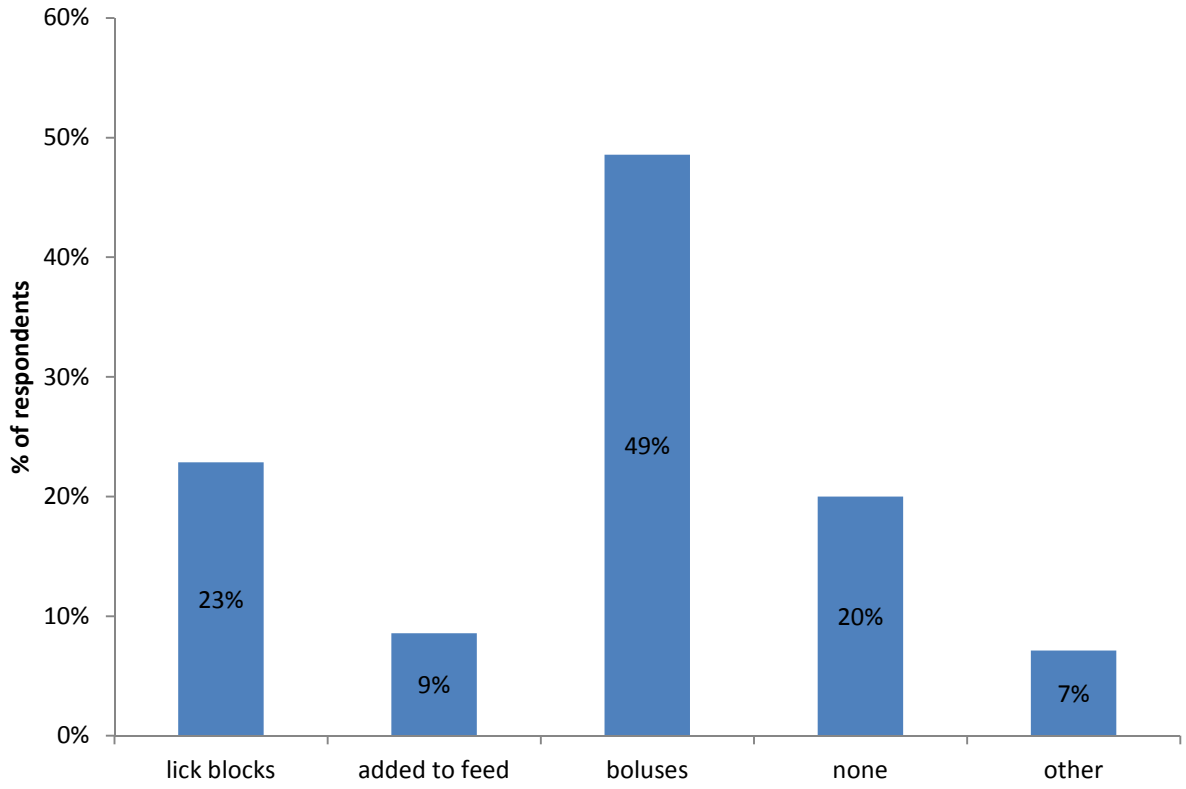

Figure 17. Supplementary minerals offered to outwintering replacement dairy heifers in GB

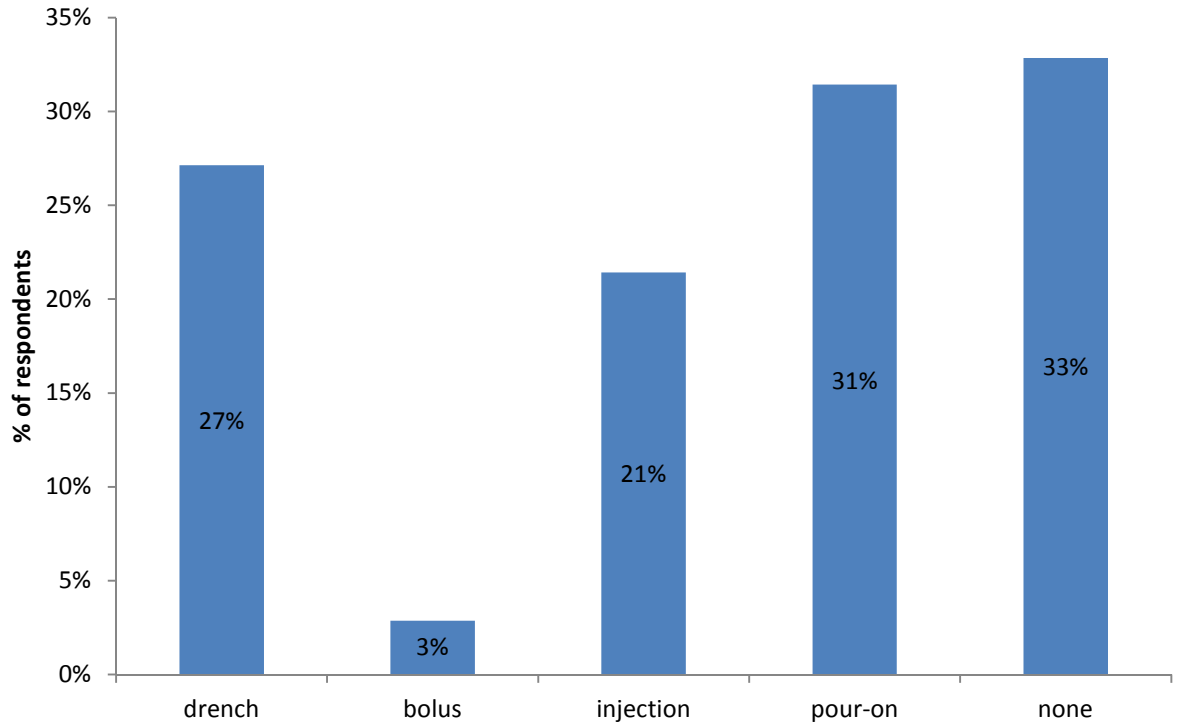

Figure 18. Worming strategy for outwintering replacement dairy heifers in GB

4.10 Water availability and severe weather strategy

Permanent and movable water troughs were the most popular means of providing water, with 54% and 56% of responses respectively (Fig. 19). A range of strategies were employed in response to severe weather (Fig. 20). The most popular were to allocate an additional area (43%), and provide additional supplementary feed (41%), whilst 40% did not consider that any change to management was necessary.

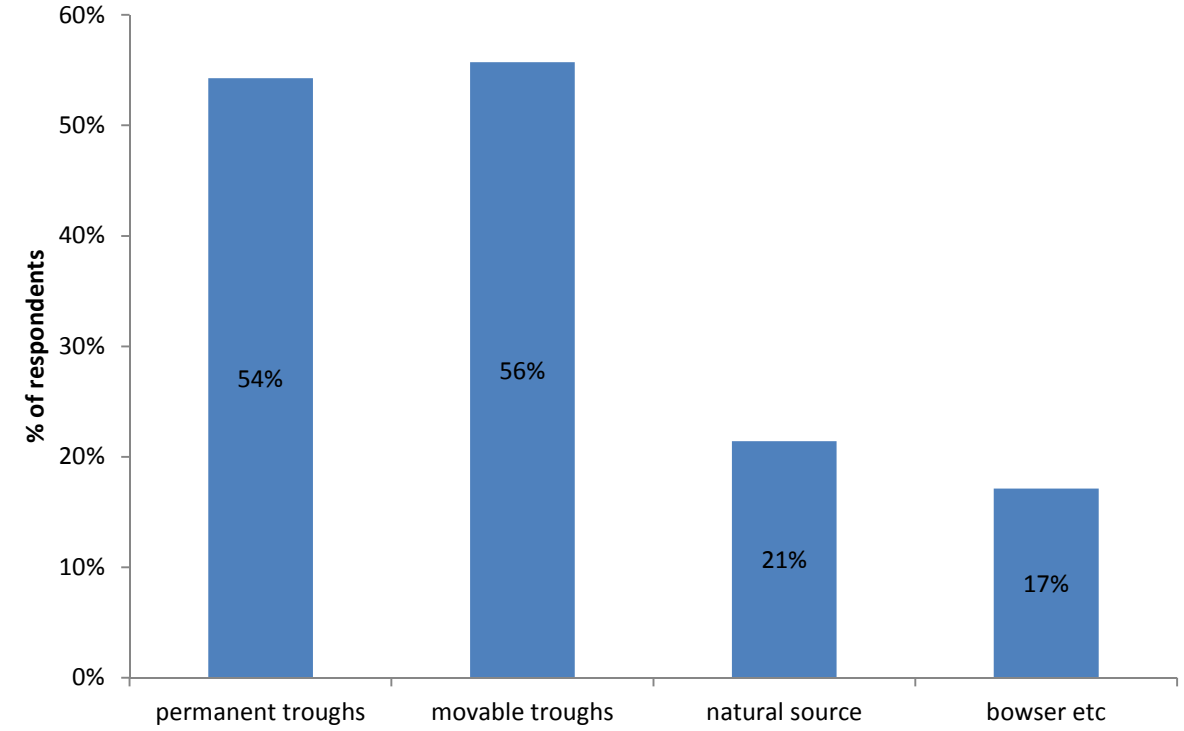

Figure 19. Water sources for outwintering replacement dairy heifers in GB

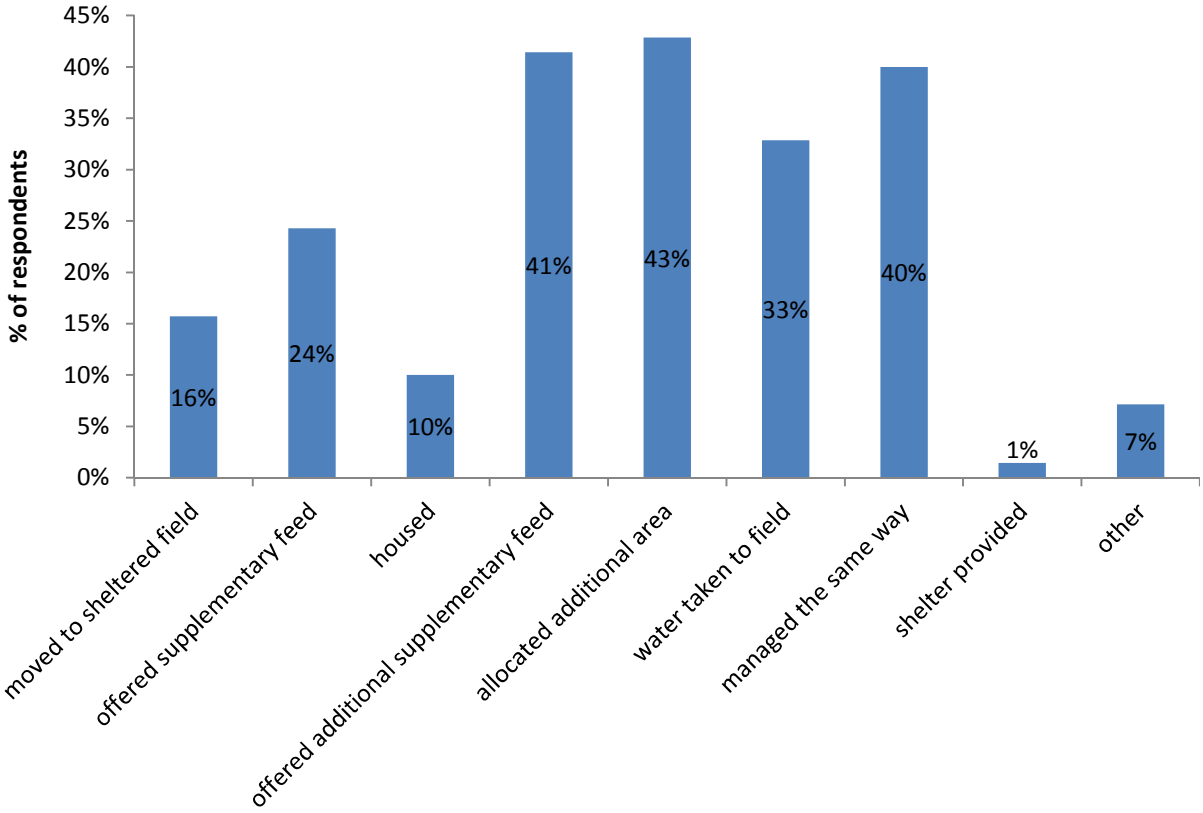

Figure 20. Strategies for dealing with severe weather when outwintering replacement dairy heifers in GB

4.11 Change in weight and condition of outwintered heifers

The majority of farmers (59%) considered that their heifers gained condition over the outwintering period, whilst 37% considered that there was no change (Fig 21). A small number (4%) felt that the animals lost condition. The mean condition score at calving was 3.17, ranging from 2.41 to 4.5 (Table 17). Only 17% of the respondents appeared to be monitoring live weight gain of outwintered heifers. Where live weight was measured, for heifers <1 year old, the mean live weight gain over the outwintering period was 0.56 kg/d, ranging from 0.4 to 0.8 kg/d (Table 18) and for heifers >1 year old, the mean weight gain was 0.61 kg/d, ranging from 0.38 to 0.9 kg/d. For animals that were in poor condition, most farmers housed them (54%), or managed them in a separate outwintered group (35%; Fig. 22). A smaller number of farmers (19%) made no specific management change for poor condition heifers or sold the poorest animals (6%).

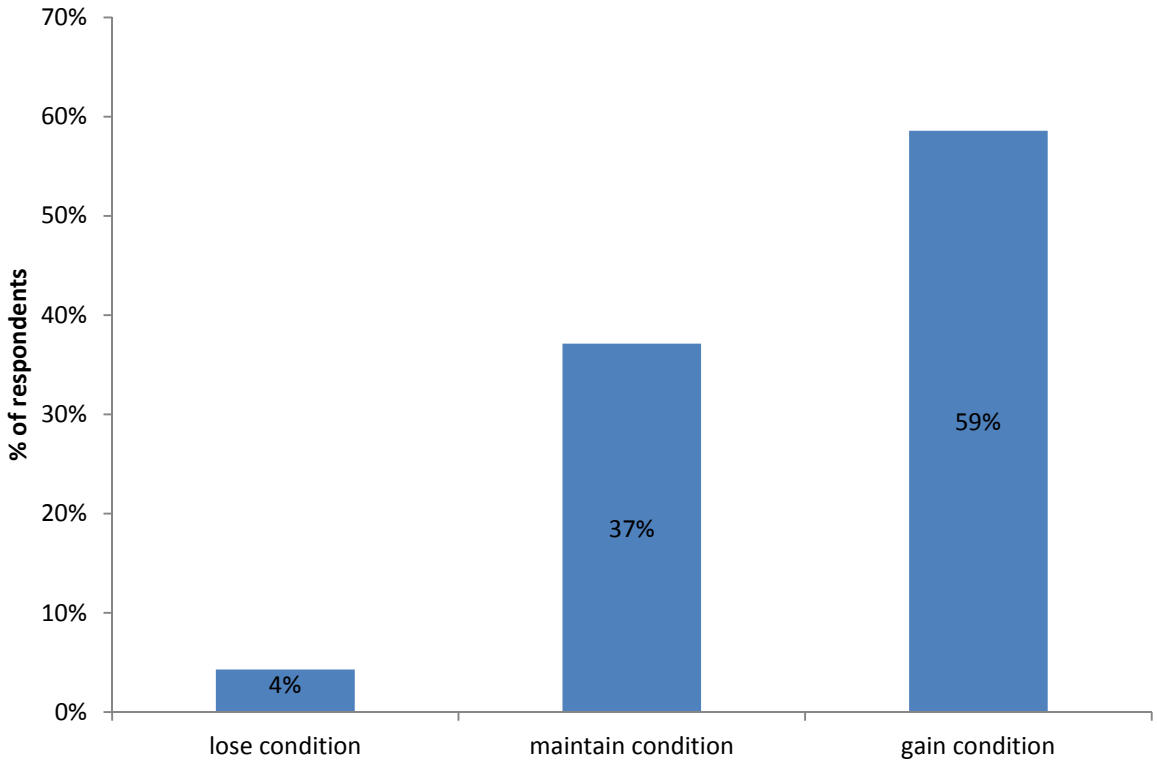

Figure 21. Average body condition change of outwintering replacement dairy heifers in GB

Table 17. Average body condition score at calving of outwintered replacement dairy heifers in GB

	Number of respondents	Mean	Std.Dev.	Median	Min.	Max.
UK body condition score (1-5)	57	3.17	0.41	3.00	2.41	4.50

Table 18. Change in live weight over the winter period of outwintered replacement dairy heifers in GB

	Number of respondents	Mean	Std.Dev.	Median	Min.	Max.
Heifers <1 year old kg/d	10	0.56	0.12	0.55	0.40	0.80
Heifers >1 year old kg/d	7	0.61	0.19	0.60	0.38	0.90

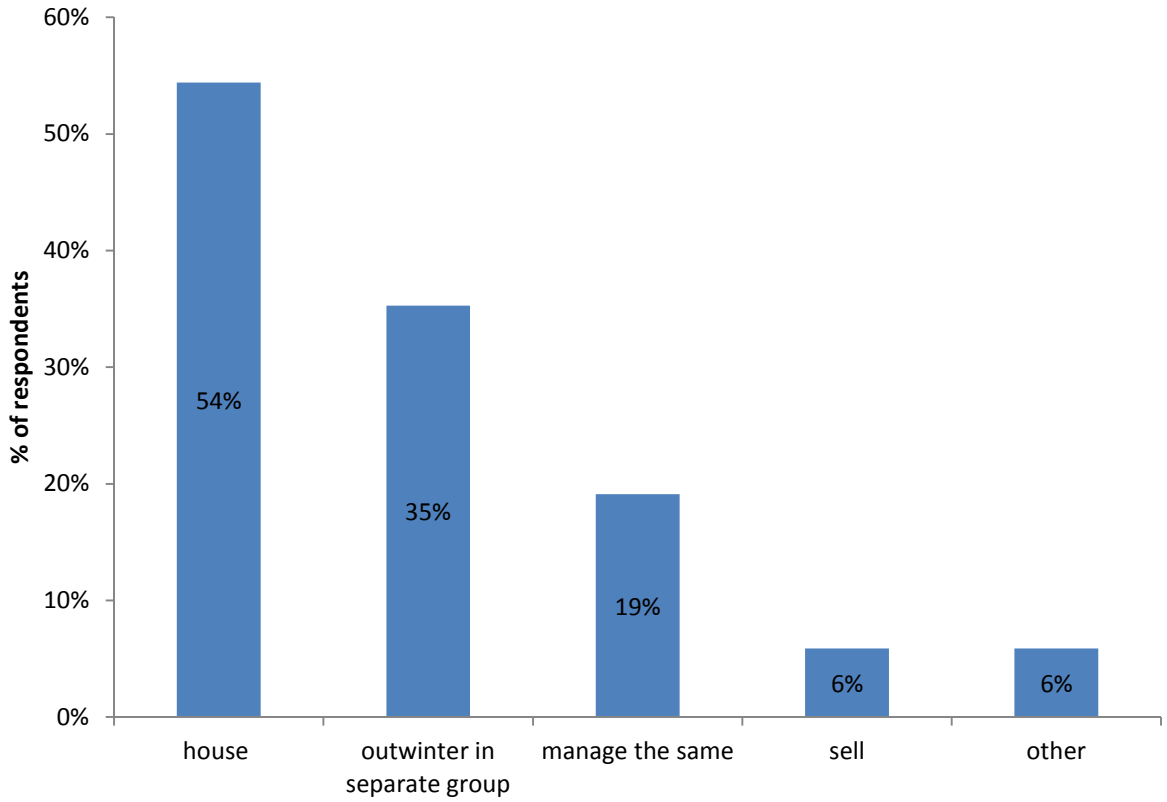

Figure 22. Management of poor condition/underweight animals during outwintering of replacement dairy heifers in GB

4.12 Perceived success of outwintering

The major benefit to outwintering was considered to be the reduction in overall costs and corresponding increase in profit (Table 19). The next perceived benefit was a reduction in feed and labour costs and reduction in time spent per day during the winter. In contrast, the least perceived success was the winter growth rate of the heifers, production in first lactation and body condition, although the respondents most commonly felt these were the same as for housed heifers.

Table 19. Perceived success[1] of outwintering compared with housing heifers of farmers outwintering replacement dairy heifers in GB

	Number of respondents	Mean score	Std.Dev.	Mode score	Min. score	Max. score
Overall profit	68	1.76	0.492	2	0	2
Overall costs	69	1.74	0.504	2	0	2
Feeding costs	70	1.63	0.594	2	0	2
Overall labour costs	70	1.50	0.757	2	-1	2
Time spent per day in winter	70	1.43	0.809	2	-1	2
Vet and medicine costs	70	1.41	0.771	2	0	2
Mobility/lameness of heifers	69	1.11	0.919	2	-1	2
Yearly growth rate of heifers	69	0.88	0.868	1	-1	2
Cleanliness of heifers	70	0.86	1.092	2	-2	2
Time spent preparing for winter	68	0.76	1.173	2	-1	2
Body condition of heifers	70	0.53	1.046	0	-1	2
Milk production in first lactation	52	0.44	0.850	0	-1	2
Winter growth rate of heifers	69	0.27	1.002	0	-1	2

[1]as rated on a five point Likert scale (-2 much worse, -1 little worse, 0 same, 1 little better, 2 much better)

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4.13 Research priorities for outwintering heifers

Economics of outwintering and effects on subsequent fertility were rated as the most important areas for future research, although several other areas were also rated very highly including subsequent effect on milk yield and relevance to cross compliance (Table 20).

Table 20. Research priorities[1] with regard to outwintering replacement dairy heifers by farmers outwintering replacement dairy heifers in GB

	Number of respondents	Mean score	Std. Dev.	Mode score	Min. score	Max. score
Economics of outwintering	66	4.26	0.95	5	1	5
Subsequent effect on fertility	67	4.16	0.99	5	1	5
Effect on animal health	65	3.94	0.85	4	1	5
Forage costs	66	3.91	1.03	4	2	5
Subsequent effect on milk yield	65	3.89	1.08	5	1	5
Comparison of crops	63	3.83	0.79	4	2	5
Relevance to cross compliance	65	3.80	1.18	5	1	5
Environmental impact	65	3.69	1.16	4	1	5
Minerals and outwintering	65	3.55	1.15	3	1	5
Comparison of varieties	63	3.52	1.00	4	1	5
Public perception	66	3.52	1.28	4	1	5
Agronomy of crops	63	3.40	1.19	4	1	5
Supplementation	64	3.34	1.03	3	1	5
Increasing crop utilisation	62	3.31	1.15	3	1	5

[1]as rated on a five point Likert scale (1 not important, 2 slightly important, 3 moderately important, 4 very important, 5 extremely important)

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5. Conclusions

Outwintering replacement dairy heifers in Great Britain occurs mainly from southern Scotland down to the south west of England, and in a variety of weather conditions. It is most often practiced by herds with seasonal spring calving patterns (69%), although there are a number of higher output, all year round calving herds that are outwintering (14%). The average number of heifers <1 year old outwintered has been increasing over the last 3 years, while the average number of heifers >1 year old has increased but more slowly. The replacement rate stated by the farmers was 20%, lower than the national average (DairyCo 2012). The number of heifers reared on each farm, was on average well in excess of the replacement rate requirements, possibly indicating a future increase in herd size and/or extra income from livestock sales.

Reducing the cost of rearing replacement heifers was the number one reason for outwintering. In relation to the perceived success of outwintering, costs also featured very highly, and increase in profit and cost reduction were the two most highly rated successes of outwintering. The second highest reason for outwintering heifers was to improve animal health and welfare. Vet and medicine costs and mobility/lameness of heifers, were considered to be better with outwintered heifers than those housed. Despite this, access/perception of the public was the third highest reason considered when selecting outwintering fields, and public perception, relevance to cross compliance and effect on animal health were all considered important for future research. This may indicate that although dairy farmers consider outwintering to have benefits on animal health and welfare, they do not consider that the general public always agree. Although 66% of farmers were expanding, expansion of cow numbers was not a major reason given for outwintering replacement heifers.

Soil type was the most important consideration for selecting outwintering fields, and using a free draining field was important to reduce poaching and run-off, along with using a backfence and providing a dry lying area. Dry lying areas were most commonly regarded as the result of selecting the right field or where grass run-back/headland areas were available. Avoiding steep fields and having a buffer strip were rated highly to reduce water run-off.

Grass is the most common forage used for outwintering all age groups, with kale being the most common sown forage crop. Fodder beet was the third most popular forage for heifers >1 year old (32%), although this was not the case with heifer <1 year old, with fodder beet less popular than hybrids and stubble turnips. Swedes, although popular in other countries such as New Zealand (Nichol et al., 2003), are not commonly used for outwintering heifers in GB. Only 47% of the farms measured crop yield, which is likely to be in contrast to the attitudes of these farms when measuring pasture yields. Methods of allocating the crop varied but appears to be based on achieving a crop utilisation of around 80%, with strip grazing being used in the majority of cases (70%).

On average, the diet is made up of 44% supplementary feed for heifers <1 year old, and 35% for heifers >1 year old. Big bale silage is the major form of supplementary feed, being used on 83% of farms in the case of heifers <1 year old, and on 87% of farms in the case of heifers >1 year old. The main form of delivery was to ‘store’ the bales in the field (66%), which are either fed as they are, or fed using a ring feeder. Farmers consider that supplementary feed waste is low, with an average value of 12%. Drinking water is always available to outwintered heifers, usually from permanent or movable water troughs, with movable water toughs allowing the use of a back fence, seen as important for reducing poaching. Natural water sources are made use of if available (21%) and bowsers (17%) may be used to take water to fields in extreme weather.

The most common measures for managing extreme weather were extra feeding, either by allocating additional area (43%) or offering additional supplementary feed (41%), and taking water to the field (33%).

The highest perceived benefit of outwintering was to improve overall profit, followed by reducing costs, and this was also the aspect that most farmers wished to see more research on, although several other areas were also considered very important including subsequent effects on fertility and milk yield, effect on health and welfare, relevance to cross compliance, environmental impact and mineral supplementation.

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