# 5. Discussion

The rapid evolution of the Grazing Animals Project from the FACT group on 'Supplying the Animals' and from the ideas for the Grazing Forum explored at the 1997 Liverpool John Moores University workshop indicates that the time was ripe to address the issues surrounding the use of grazing animals in habitat management for conservation. The response to GAP from site managers from a very wide range of conservation agencies in both seeking advice and, more often, sharing their experience confirms the topicality of conservation grazing and enables others to build on the success of many grazing projects. The completion of Questionnaires A and B by site managers and others involved in conservation grazing is part of this sharing process and the authors, on behalf of the GAP Steering Group, thank all who gave their time to complete the questionnaires.

In writing the report it seemed more appropriate to comment on the results in the relevant section rather than follow scientific convention and hold over all discussion to a separate section. By adopting this approach it is hoped that each section is more or less 'free-standing' so that readers will be able to use the report at least partly as a manual to which they can refer for information on a particular aspect of conservation grazing. Thus this discussion will be brief and will seek to re-emphasise the main points that arise from the analysis of the questionnaire returns.

Although completion of the questionnaires was site-based the analysis which has been undertaken sought to draw general principles and recurrent themes from these data. In some instances a site-based analysis may yield further insights; for example, for what habitats did respondents wish to replace existing stock with another type? Or on which habitats is a particular breed effective? Such questions are valid and may inform the site manager planning a grazing scheme but were beyond the scope of a single report. The data analyses that were completed by CP and DAJ included site-based tabulations and it is hoped that these will be published in some form in due course.

The surveys may be criticised in not being a random, or even a stratified, sample of all the grazed conservation sites in the U.K. As noted above (Section 2.2) Questionnaire A was distributed, on the recommendations of GAP Steering Group members, to site managers considered likely to complete and return them. A second group targetted were the Wildlife Trust Reserves Officers; added to these were the rather more random, but self-selected, participants in the LJMU workshop and those expressing a wish to join the GAP mailing list. Questionnaire B was possibly even less representative in being distributed to those requesting one or known to have encountered difficulties in establishing a grazing scheme. The result was that an estimated 35% of Questionnaires A were returned and analysed; fewer Questionnaires B were distributed but as many of these had been requested the response rate was probably greater. As previously noted the information from Questionnaire B was supplemented by responses to Questions 28 and 29 of Questionnaire A and the discussions at the Crewe meeting.

Despite these limitations it is believed that the results represent a valuable summary of the collective experience of conservation site managers. Section 3.1 records the wide range of

conservation agencies, including the countryside services of local authorities, were represented in the Questionnaire A survey both as owners and as managers of sites owned by private individuals or companies. The sites were well distributed over England and, although they were perhaps under-represented, there were sites from Scotland, Wales and Northern Ireland. The sites were financed by a variety of grant schemes from both conservation and agri-environment funds and they ranged in size from less than 1ha to more than 1000ha. Perhaps the most notable variation was in the conservation status of the sites represented in the survey: a few had no formal conservation status but those that did varied from sites recognised at the county level or less to the one International Biosphere Reserve. A large proportion were recognised at the national level by their SSSI, ASSI or NNR status. All these features suggest that a useful cross-section of sites of conservation value was represented in the survey.

Similarly, a wide range of habitats was included, at least if the limitations imposed by grazing as a management technique are allowed for (Section 3.1.7). Upland sites were perhaps less frequent than might be expected but otherwise coastal/inland location, topography, wetness and soil types were all adequately represented. As a consequence all the main grazed habitats were included despite the dominance of grasslands. This dominance was also clear in the NVC communities for those sites where NVC surveys had been completed; although 108 communities were recorded half were present on just one site. However, there is no reason to suggest that the communities recorded were not representative of the grazed areas of conservation sites.

Twelve woodland communities, distributed over 29 sites, were amongst the NVC communities recorded and further examples of grazed woodland were given in Box 4. Although indiscriminate access to woodlands by grazing animals can prevent the regeneration of trees and cause damage to woodland flora, there is increasing interest in the beneficial effects that low densities of grazing animals can have in woodlands and pasture-woodlands (Chatters and Sanderson, 1994; Hester *et al.*, 1999; Read, 1993, 1994). This re-appraisal comes from the consideration that British woodlands would have been subject to grazing and browsing from a variety of large herbivores which have steadily been reduced in number, range or, more frequently, hunted to extinction (Rackham, 1994). Both wild and domestic animals may have a role in replacing this natural grazing and browsing (Hester *et al.*, 1999) and even pigs are developing a role as replacement wild boar in promoting regeneration through rooting (and so burying some seeds) and through bracken control (Kennedy, 1998).

It is beyond the scope of this report to discuss the grazing of each habitat represented in the survey although it may be possible to extract that information at a later date. There are, however, a number of published sources which discuss various habitats e.g. Bowley (1994), Bullock and Pakeman (1997), Chatters and Sanderson (1994), Gordon *et al.* (1990), Hearn (1995), Houston (1997), Jefferson and Robertson (1996) and Oates (1993). As mentioned in the introduction there are also a number of reports which compare grazing schemes and the species they employ: Bacon (1998), Oates *et al.* (1998) and Tolhurst (1997).

The diversity of breeds and crosses of grazing livestock utilised was remarkable (Section 3.2), especially amongst sheep (46 breeds/crosses on 71 sites) and cattle (54 breeds/crosses on 72 sites). This diversity suggests that often the expediency of using locally available animals is the reason for the 'choice' of breed. Certainly where a grazier is contracted to provide the grazing

site managers may have little or no control over the breeds used. Although commercial herds or flocks may achieve the conservation objectives of grazing more than adequately if agricultural production is not important, too often the grazier's need to make a living from the animals leads to dissatisfaction on the part of the grazier, the site manager or both as revealed by the responses to questions on establishing and sustaining a grazing project. Clearly, this has been greatly aggravated by the BSE crisis and, in particular, the Over Thirty Months Scheme (OTMS) which makes finishing cattle on relatively unproductive herbage alone all but impossible (Winter *et al.*, 1998).

Despite OTMS the majority of cattle breeds were beef breeds or crosses. Much conservation grazing would not sustain the high demands of modern dairy breeds and the frequency with which Friesian cattle were represented in the survey (they were the second most common breed) can again be explained in terms of ready availability. From the survey Highland cattle had clearly established a role in conservation grazing as a hardy, thrifty, adaptable and attractive breed. The conservation of minority breeds such as Highland and Dexter, and rare breeds such as British White and Longhorn, may benefit from this additional role in conservation grazing (Small, 1994; Mercer *et al.*, 1998). The responses suggest that more managers would prefer to use rare or traditional breeds, but by definition rare breeds are scarce and the difficulty of finding sufficient animals is that much greater. Breed societies could have a valuable role to play in both promoting suitable breeds to conservation managers and by producing lists of breeders who would supply animals or graze sites. If, as seems likely, farming and conservation eventually become more integrated, breed societies that have traditionally promoted the productivity of their breeds may be less reluctant to also promote their use in conservation.

Similar arguments could be advanced for the use of some rare breeds of sheep. Like Highland cattle, Hebridean sheep have established a reputation for conservation grazing on a variety of habitats (Braithwaite, Grooby and Newborn, 1997) and were the most widely used breed in the survey. In this instance the breed society has actively engaged with conservation managers and the steady increase in Hebridean numbers (which has allowed them to leave the R.B.S.T.'s priority list) is in large part as a result of this demand from conservation managers.

Other rare, primitive breeds such as Soay and Manx Loghtan also have good records in habitat management for conservation, although the former also has a reputation for being difficult to contain and round up. This may be exaggerated as two Soay flocks were recorded as being catchable to a trailer/lorry/pen by hand or with the aid of a food bucket (Section 3.2.16); at the other extreme one essentially feral flock was described as totally wild and, because of the implications for the safety of road users and the stock themselves, they could not be rounded up. Consequently the only recourse for dealing with the expanding population was culling. Managers contemplating using Soay should therefore take heed of the management system to which the sheep have become accustomed. In the survey one Manx Loghtan flock was also described as totally wild but two other flocks appeared as tractable as most commercial sheep which supports the contention that management system (which may be affected by difficult terrain) is influential in determining tractability.

For the main part the sheep breeds and crosses used were hardy, hill breeds such as Herdwick, Swaledale and Welsh Mountain (Section 3.2.2). The second most widely used breed, Beulah

Speckled Face, can also be classified in this group although originating at lower altitudes than the others. This breed has been used by English Nature for two decades on the Wiltshire and Hampshire Downs and has spread to other English Nature sites; however, it is not widely used by other conservation agencies and, although effective on grasslands, is probably no more so than would be a range of other breeds originating in the Welsh hills e.g. Hill Radnor, Kerry Hill or Llanwenog. However, such breeds are as yet unproven in conservation management whereas Beulah Speckled Face has established its credentials.

Some lowland sheep breeds were used e.g. Lleyn, Dorset, Hampshire Down, Jacob, Portland and Southdown; these are presumably only suitable for less challenging sites. The last two have the added attraction of being rare breeds and the Jacob is popular with the public because of its piebald fleece and multi-horned characteristic.

Like grazing animals in woodlands, the image of horses and ponies as grazing animals has been tarnished by too many over-grazed, weed infested paddocks in the urban fringe. However, horses and ponies have also undergone re-appraisal in recent years and ponies in particular have emerged as invaluable in many conservation grazing schemes (Oates, 1994a; Gibson 1997). Perhaps their best feature is to largely leave the flowers of forbs uneaten while eating large quantities of grasses; this was partly supported by the data on preferred plants which featured many grasses and sedges, although shrubs and trees were also frequent. Exmoor ponies were the most frequently used breed and, like Highland cattle and Hebridean sheep, have developed a reputation in conservation grazing schemes on widely different habitats.

Two other breeds (New Forest and Welsh Section A) were quite common (Section 3.2.7) but tend to be used more in their areas of origin. The New Forest is used widely on the southern heaths and pasture-woodlands and, with cattle, have largely been responsible for the current vegetation mosaic of the New Forest (Putnam *et al.*, 1987). The Konik pony has been introduced because of its ability to withstand wet fenland conditions (Tolhurst, 1997) but in North Wales the local Welsh Section A ponies are used to graze marshes and seem very tolerant of the wet conditions.

Eight grazing schemes in the survey used goats with, once again, a remarkable diversity of six breeds on those eight sites. Although only one Feral English flock was recorded it is possible that the "White" goats used are also feral animals. Feral goats are being used on an increasing number of sites where control of scrub or regenerating woodland is the aim e.g. the Ventnor Downs where *Quercus ilex* is the main target (Oates, 1994b; Oates and Bullock, 1997); goats have also been evaluated for their effectiveness in controlling *Juncus effusus* in pastures (Merchant, 1993). The Bagot is a small, rare and attractive breed with, as yet, no known commercial value. For many years flocks have been run in parks with minimal management and the breed has thus been subject to a degree of natural selection. It is a thus a breed which could well develop a role in conservation grazing as an alternative to truly feral goats.

Pigs were rarely used in the sites in the survey (Section 3.2.8); they are not strictly grazing animals so may be under-represented but have a limited role in conservation management generally. Their main value is in increasing the proportion of bare ground, breaking up deep litter layers such as that under long-established bracken stands and eating bracken rhizomes.

As noted above, they are used more in relation to woodland regeneration or pasture-woodland management as at Burnham Beeches where the Berkshire pigs recorded in the survey are used. In such situations they are substitutes for the original wild boar and later free-roaming pigs at pannage (Read 1993, 1994). Although not recorded in the survey Tamworth pigs are used for bracken control and to promote woodland regeneration in the Rahoy Hills NNR (Kennedy, 1998).

The information on age and sex of animals used is perhaps better interpreted in relation to site (Sections 3.2.9 and 3.2.10). Suffice it to say that the stock used included some animals that in commercial farming might already have been culled. It is perhaps notable that the oldest sheep in use (say over 6 years) tended to be the rare and/or primitive breeds, with some hardy hill breeds, rather than commercial crosses or lowland breeds. Most cattle were in the 1-5 year age group; although this may be distorted by the effects of OTMS even in its absence most male cattle, and many females, would have gone for slaughter well before 5 years of age even on relatively unproductive pastures. Perhaps more surprising is the proportion of sites (at least 13%) on which cattle of >11 years of age were kept. Similar longevity was evident amongst the ponies with ages ranging up to 36 years, showing that an initial (modest, compared to cattle) capital investment in young ponies may give many years of grazing.

Many managers were also grazing other sites from that described in the questionnaire return (Section 3.8); where the sites vary in the demands they place upon stock it may be possible to move older animals to the less demanding sites; if still fit for breeding these stock may then breed the replacements needed on the more difficult site(s). The development of Regional Grazing Schemes may facilitate such integration.

Comments on sex of animals used is further complicated by the failure to distinguish castrates and entire males. The latter are only likely to be kept in breeding flocks and herds and then in small numbers; only in feral, or essentially feral, flocks of goats and sheep are entire males likely to be a significant proportion of the total. On the other hand, wethers can be very useful conservation grazers, often reaching an old age if allowed to do so and with a greater body mass to support throughout the year than ewes. The same is probably true of steers, although young bullocks also have a reputation for excitability that can lead to vegetation damage through trampling; however, this was not apparent from the survey and no adverse comments on the behaviour of bullocks were made. Entire male cattle, given the commonness of A.I., are even less common than rams, but the issues surrounding running a bull with cows in sites with public access was raised as a constraint on the implementation of grazing schemes (see Table 63).

The relative infrequency with which the more production-orientated reasons for keeping stock suggested in the survey were cited implied that, where managers had a choice, factors other than agricultural production determined their choice. Thus market demand, growth rate, ability to finish and fertility were low in the priorities of respondents (Section 3.2.13). The two most common reasons contrasted in that one (stock belonging to local farmer) represented expedience whereas the other (grazing behaviour) indicated that the characteristics of the stock were considered. This may represent the difference between those sites where the managing agency owns its own stock and is therefore able to select the breed and those where

stock are obtained from other owners. Of course, the two reasons are not mutually exclusive - the stock of local farmers may have excellent grazing behaviour on particular sites.

The issues surrounding ownership of the stock are well aired in the responses to the free-form questions on constraints and 'other' comments in both questionnaires. From the survey the managing agency owned at least some of the stock on half of the sites; conversely, grazing on two-thirds of sites was at least partly reliant on the stock belonging to others (Section 3.2.11). As noted above, where considerations of productivity and making a living are not involved such reliance on others may work well and frees the managing agency of some aspects of stock management, and hence reduces the need for staff training and other resources such as lay-back land. However, from the comments made there are clearly frequent difficulties when commercial graziers are used including problems relating to movement of stock on and off site at the best times for achieving the conservation objectives. Use of graziers also requires some form of grazing agreement which, as a legal document, needs to be carefully and professionally drawn up. In the survey over half the sites had a Grazing Licence Agreement; in others other legal agreements such as Tenanted Agreement, Farm Business Tenancy and Commoners' Rights were in place.

From the comments it is clear that some staff relish the contact with animals (so much so that one commentator suggested staff attachment to the animals as a constraint in itself) whereas others find the need to manage stock an unwelcome imposition. As the demand for labour in agriculture has declined increasing numbers of conservation managers have come from agriculture or related industries. Some of these will have experience with grazing animals and will be well able to judge the impact of grazing. However, other staff will need to undergo training to develop such skills; ideally only staff with a genuine interest in the animals should manage livestock - staff whose interests and expertise lay elsewhere are unlikely to get the best out of the stock. For smaller agencies, or widely dispersed sites, staff specialising in livestock management may be an unaffordable luxury but as they develop Regional Grazing Schemes may be able to provide the necessary expertise.

Managing agencies which own their own stock may also need to provide lay-back land or at least have the resources to move stock to other sites. It is apparent that many respondents were responsible for more than one grazed site and may be able to move stock from to one another. Such 'flying-flocks' are a feature in several areas (e.g. Tolhurst, 1994). Too often, however, sites need grazing, and resting, at the same times. Conservation organisations are generally reluctant to spend limited financial resources on land of low conservation value just as lay-back land; those in the voluntary sector may be criticised by their members if they did so, although in some instances a case could be made for the gradual restoration of conservation interest e.g. in arable conversion projects.

Thus the need for staff training, lay-back land or equivalent, stock handling facilities, and the demands of sole responsibility for the animals must be weighed against the potential problems of conflicting aims, lack of direct control, possibly less than ideal stock and legal agreements that the use of graziers may generate. Clearly there is no easy solution and each manager, or managing agency, must determine which is the better option. Although Regional Grazing Schemes will not be an instant panacea they may represent a third way in balancing available grazing with available, and suitable, animals.

Two other common reasons for the choice of stock were temperament and hardiness (Section 3.2.13); both are related to breed but both may also be related to environment and management system. The few comments made above on the description of some flocks as 'totally wild' or as tractable illustrate the dependence on management system: flocks that are infrequently rounded up, and then only for a, for them, unpleasant experience will be difficult to round up especially if the terrain is also difficult. In contrast, even initially wary stock can often be trained to a feed bucket quite rapidly provided such feeding does not compromise the hardiness of the animal, the nutrient status of the site or lead to localised poaching.

Hardiness is more likely to be more strongly breed-related but as few flocks or herds are subject to the full force of natural selection even the hardiest breed may become less hardy if kept in undemanding conditions. The impact of 'breeding for show' is noted as a constraint (E5 in Table 63) and managers selecting stock for purchase should consider the origins of the stock. However, the lack of suitable stock in sufficient numbers, especially for rare breeds, may cause managers to source their stock from wherever they can be found: Box 6 shows that markets and even local schools may be utilised. On the other hand other sources included marshes, sand dunes, nature reserves etc. which might be expected to yield better stock for all but the least demanding sites.

This is not the place to discuss the attributes of every breed that might be used in conservation grazing schemes but the information on breeds presented in the report may help managers take a decision on the most appropriate breed for their circumstances. GAP intends to publish a series of 'breed profiles' that will review each breed, particularly the information which relates to the use of that breed in conservation grazing. However, breeds which have been subjected to natural selection pressures in the past may retain hardy characteristics; for example, Bagot goats and Hebridean sheep survived until recently as largely unmanaged parkland flocks, and Exmoor ponies overwinter on the moor. In other cases the 'natural' environment of the animals is a good guide to their likely hardiness; Highland cattle are a good example, but many of the hill sheep and native beef breeds are also traditionally reared in harsh environments. Mercer *et al.* (1998) have recently reviewed the adaptation of rare breeds to different environments.

The reasons determining the numbers of stock used on a site appeared to be largely site-specific (Section 3.2.17) but reassuringly usually included 'specific conservation objective'; other common reasons were, in decreasing order of desirability, pasture productivity, trial and error and availability of suitable animals. Over 50 'methods' were used to resolve these and the other issues governing stock numbers but many involved some assessment of the success that grazing was having; nevertheless the need for monitoring of vegetation condition was raised as a constraint by several respondents. In other cases numbers were dictated by SSSI, CSS or ESA limits but there was no indication of whether managers thought these appropriate; elsewhere the farmer, tenant or grazier took the decision on numbers and in these instances it might be appropriate, as suggested in Table 63, for the site manager to use a photograph to illustrate the desired sward to guide the decision.

As noted in Section 3.2.17 'trial and error' was not as haphazard as it might seem but rather was part of the process of balancing stock numbers with the available herbage and conservation objectives; as such a variety of factors were assessed in coming to a conclusion.

Even with accumulating information on conservation grazing such judgements will always have to be made as each site (and the animals used) will vary. Farmers and graziers have been making similar judgements for years and may have a greater fund of experience on which to draw. Even if not directly involved with the grazing of a particular site they may be able to advise inexperienced managers provided they know what sward height and condition is desired.

The objectives of grazing suggested in the questionnaire may have concentrated too much on aspects of stock productivity, although 'as a conservation tool' was not only given as an option but was the subject of a supplementary question. That productivity was not a major consideration at many sites tended to be supported by the responses to questions on the marketing of stock which indicated that only 39% of sites sold the progeny of their animals and that just 11% used a premium marketing scheme (Section 3.7). However, these results may be a reflection of the reliance on farmers and graziers at many sites and would presumably only apply to the 50% of sites where at least some of the stock were owned by the managing agency.

Determining whether a scheme makes a profit or loss will depend on the factors costed into the equation, particularly the staff (and volunteer) time and other resources provided by the managing agency. There are also variable costs such as veterinary treatment and variation in returns from year to year; most of the responses analysed would refer to the period before the 1998 collapse in livestock prices and the profitability of some schemes may now be less satisfactory. Profit or loss may also depend on the level of agricultural subsidy for which the site qualifies, if any; for example, long established schemes using sheep may have been eligible for sheep annual premium (SAP) quota when this was introduced in 1992. Later schemes would need to purchase or lease quota if SAP was to be claimed. In these respects it would be instructive to compare the 17 schemes which made a profit with the 18 which made a loss; it would also have been interesting to ask the size of the profit/loss as there may be little practical difference between a small profit and a small loss.

Given the sites described in the returns it is perhaps unsurprising that 'as a conservation tool' was by far the most frequently recorded of the eight objectives of grazing suggested in the questionnaire and nine additional objectives given by respondents (Section 3.3). Even so, on 40% of sites at least one other 'main' objective was attempted which would complicate decisions on stock selection, grazing intensity, grazing period etc.

Within those sites for which the main grazing objective was conservation a wide range of grazing aims were suggested, although some of these were attributes of the animals used. Others, such as conservation of butterflies, dragonflies and birds are achieved through the creation of suitable habitat by grazing and hence could be considered a product of improving vegetation structure, developing a vegetation mosaic etc. The evaluation of the effectiveness of grazing animals in achieving these varied objectives was revealing, despite the likely variation in assessment between respondents. Within species no breeds appeared particularly poor overall and judgement between breeds relies more on the lists of objectives in good and very good categories after controlling for recording effort i.e. how frequently a breed was used in the sites represented in the survey. Thus the data are perhaps more useful in

confirming what objectives the various species can achieve well which may help managers to decide which is most appropriate to their sites.

There is little doubt that the well established breeds in conservation (i.e. Beulah Speckled Face, Hebridean and Soay sheep, Highland cattle and Exmoor ponies) have impressive lists in above average categories (Tables 29-32). These data will no doubt encourage their continued, and expanded, use but experimental comparisons with other breeds would be useful. It seems unlikely that many managers will be willing and able to conduct such studies, especially if there is a risk of sub-optimal management of parts of their sites. Progress will therefore depend more on the comparative approach than the experimental: the use of grazing animals and their impact should be monitored on all sites, preferably using standard protocols, and the data shared so that best practice can evolve. That such studies are needed is shown by the range of effectiveness recorded for the same objectives in Beulah Speckled Face and Hebridean (Section 3.3.2) which could result from a combination of variation within the breeds, the variable evaluation by individual site managers and differences between sites. It is probable that other breeds would show equal variability if they had been used as widely as Beulahs and Hebrideans. However, as lack of time for monitoring was identified as a problem on existing grazed sites even comparative data may be hard to obtain. It is hoped that this survey will stimulate further recording and exchange of information.

The same could be said for the lists of plants 'liked' and 'disliked' by the various species and breeds (Section 3.4). It is certain that the lists for each breed could be lengthened and that managers will disagree with some of the species recorded. There is also a judgement to be made between species which are (or are not) eaten and those which are 'liked' (or 'disliked'); for example, plants that are disliked may eventually be eaten if there is little other forage. Respondents were asked to identify plants that their animals 'like or will not eat': the latter is probably easier to assess as managers can observe plants left at the end of the grazing season whereas it may be less apparent which plants are eaten first. Preferences can also change as plants appear, grow and senesce and with what other herbage is available. Here too there are opportunities for study and recording, especially with regard to changes in preferences with age or between males, females and castrates.

Within both 'liked' and 'disliked' lists there are plants that most managers would welcome being eaten, and those they would not (Section 3.4). An analysis of such species was contemplated but there were too many species for which grazing was desirable in some situations but not in others e.g. shrubs may be undesirable where they are invading species-rich grassland but be an important element in the mosaic of other sites. Thus for site managers use the information in the tables of likes and dislikes to aid decisions on species or breed choice they will need to decide for themselves which species they wish grazed and they should also consult other sources such as Gibson (1997) and Rich (1997).

The information on periods of grazing served to illustrate the great variety of management systems employed and almost defies summary (Section 3.5); even an attempt to summarise by season produced 14 categories! However, two of these were clearly more frequent: summer/autumn and all-year grazing. The latter may not, of course, imply that the entire area was continuously grazed: 73% of sites were sub-divided and this may have allowed rotational grazing between compartments. It appeared that few sites had access to lay-back land but this

may, in part, reflect reliance on graziers who would remove their stock when necessary. However, it is also clear that reliance on graziers is not always a solution as comments on over-grazing by graziers, or their reluctance to remove stock when asked, were not infrequent.

As noted in Section 3.5.2 if graziers are not used an important consideration of conservation grazing schemes is the ability to remove stock to lay-back land, or alternative sites, when the optimum sward condition or stock welfare could be compromised by further grazing. Where regular seasonal variations underlie the need for grazing animals traditional farming solutions may be appropriate: selling and buying (or breeding) as required and feeding conserved forage (silage or hay) when grazing is in short supply, provided this does not adversely affect the conservation value of the site. However, this may be rather glib when added to the work of site managers whose job descriptions do not include weekly visits to the local market. Even Regional Grazing Schemes may not provide an ideal solution unless they also include access to lay-back land as many sites will need to be grazed at similar times for the best results.

The potential problems associated with supplementary feeding were outlined at the start of Section 3.5.3. Despite these problems a wide range of supplementary feeds were provided although some of these could be considered more as ensuring stock health than as replacements for fodder. It is unlikely that salt licks and energy or vitamin blocks would have an adverse affect on the nutrient status of the soils, but the other supplementary feeds may have. Once again the variety of periods during which supplementary feeds were offered served only to emphasise the diversity of the sites and their management. In some instances supplementary feeding may be as much about maintaining an easily rounded up flock or herd as any nutritional requirement: the food bucket featured frequently in the assessment of the tameness of the stock, and this technique needs regular re-inforcement to be effective. The quality of cattle forage on Dutch nature reserves has been investigated by Bokdam and Wallis de Vries (1992) and Tallowin (1997) gives a great deal of information on the nutritive value of semi-natural grasslands which may help managers decide whether supplementary feeds are required.

Information on the supplementary feeding of individual breeds (Section 3.5.3) is of limited value without knowing the management system used and when the feeds are provided. However, they serve to demonstrate that almost all breeds received some supplementary feeding although some hill breeds of sheep and many of the cross-bred beef cattle received only energy, mineral or vitamin blocks. There was a slight tendency for young sheep to be given more types of supplementary feed but this was much more marked in cattle where animals of <2 years were frequently given supplements. This often continued into the 2-5 year age group but may be required in order to finish animals before 30 months if they are to be sold for beef.

The range of health problems and the preventative and curative treatments applied (Section 3.6) represent a considerable investment of staff time and as well as the expense of the veterinary medicines; if a veterinary surgeon attends to the animal the costs will be substantially greater. There may also be implications for conservation in the use of organophosphate or synthetic pyrethroid sheep dips and ivermectin formulations (Section 3.6.6). On the other hand, the welfare of stock used for conservation grazing must be a paramount consideration both as a legal requirement and from the perspective of public

relations. Several respondents mentioned the concern of the public over the availability of sufficient herbage or the use of grazing animals on sites with difficult topography (e.g. sea cliffs); on one recorded occasion the RSPCA were involved, although in that instance the inspectors were satisfied that all was well. Some stock are more likely to provoke public comment than others. For example, New Forest ponies seem to have a marked, but natural, tendency to lose condition in winter leading to concerns over their welfare; in contrast Exmoor ponies generally remain well rounded unless ill or under severe stress.

In sheep the most common veterinary problem was flystrike; although this is quite easy to prevent by the use of pour-ons (as well as by dipping and other means) it does require the flock to be rounded up, penned and treated two or perhaps three times over the summer. Without preventative treatment flystrike can be difficult to spot until it is too late - and even then in warm weather it is difficult to decide whether a maggot-ridden corpse is a victim of flystrike or was infested after death. Footrot was also fairly common and is more difficult to eradicate and time-consuming to treat, although a vaccine is available. However, the bacterium responsible does not survive long on pasture or in the soil and unless sheep are grazing the site all year it is probable that they arrive with the infection. Ensuring that all sheep are treated before release may therefore help to delay the onset of problems. Some breeds (e.g. those with black hooves) are reputed to be less susceptible to footrot than others but there is a great need for comparative trials to confirm such claims. However, in the survey footrot in Hebridean sheep was reported to be rare and only in <10% of the flock and in Black Welsh Mountain was not recorded (Section 3.6.1).

Cattle seemed subject to a wider range of veterinary conditions including mineral deficiencies which together were the most frequently recorded (Section 3.6.2). Once identified as a problem on a site provision of appropriate mineral blocks should prevent problems developing, but these may need to be moved regularly to prevent poaching or localised nutrient enrichment through an increased concentration of dung around the blocks. Alternatively they may be sited where increased trampling is desirable e.g. amongst dense bracken stands.

The high incidence of pneumonia recorded in cattle is worrying, especially amongst animals that are not enclosed. There are several causes of pneumonia in cattle and appropriate treatment will depend on correct diagnosis. New Forest eye and liverfluke were also common conditions. The former requires daily applications of medication to the affected eye(s) and hence is time-consuming and difficult if the cattle are not used to close handling. Liverfluke is restricted to damp habitats or those adjoining wetlands; in the survey only a small proportion of the herds was recorded as infected, although this may be those showing symptoms. Once identified treatment is straightforward but still requires that the animals be rounded up. Redwater fever is a localised disease and locally reared cattle will develop immunity whereas stock brought in from other areas may rapidly succumb; managers planning a grazing scheme using cattle should ask a local veterinary surgeon whether redwater fever is prevalent in the area. Indeed, to ask about locally occurring diseases, including mineral deficiencies, would be a wise action for all grazing schemes in order that any preventative actions can be costed into the proposals and to avoid later problems.

It is somewhat worrying that almost a third of respondents would prefer to be using a different breed, age or sex of grazing animal (Section 3.9). Some of these may be sites which depend on

graziers with commercial flocks or herds which are considered less than optimal. Half of those preferring a different species specified cattle which may be justified as the lists of preferred and avoided plants and the evaluation of the efficacy in achieving conservation objectives indicated that cattle grazing differed from the grazing of other livestock. The legal and physical requirements for keeping cattle are greater than for other species and individual animals represent a larger capital investment. Graziers are therefore loathe to graze cattle on marginal sites or those where hazards such as cliffs or deep ditches are present. Ponies may be a suitable, and cheaper, substitute for cattle in achieving some objectives, particularly those related to trampling effects.

The answers to the 'free-form' questions regarding the problems of establishing and running grazing schemes (Sections 3.10 and 4.2) indicated that obtaining the best stock at the right times to achieve optimal results were widespread. This was made more so by the need, or desire, to use hardy, native breeds - all the 22 breeds identified as preferred to those currently used could be so described except the hardy but non-native Camargue and Polish ponies. Regional Grazing Schemes may help with this problem and GAP has a role in publicising the need for stock, especially to owners of rare or traditional breeds with limited grazing who may be more interested in additional, marginal, grazing than commercial farmers. The response to recent GAP reports in *The Ark* (magazine of the R.B.S.T.) and in *Organic Farming* (Read, 1999) have demonstrated that such interest exists, although there may still be difficulties. For example, owners may find it difficult to increase stock numbers if there is a need to remove them from the conservation site on to their own limited grazing when the conservation objectives have been achieved.

Determining the optimal stocking rates was also identified as problematic, particularly when the managing agency relied on grazing agreements or licences to determine stocking levels at the outset of an unpredictable grazing season. Account also needed to be taken of grazing by wild animals, notably rabbits with highly variable populations. On some sites in the survey rabbit control was practiced but the cost involved meant that this was usually only partial. On the other hand rabbit grazing can be an important determinant of vegetation structure and mosaic and in at least one conservation site rabbits have been re-introduced (Whatmough, 1995).

Adverse public reaction was also a problem that persisted through and beyond the establishment phase of grazing schemes. For the most part this can only be solved through consultation and negotiation at the local level, although there may be role for GAP in producing general information on the benefits of grazing conservation sites and in preparing a best practice guide to the establishment of grazing schemes which would include, amongst other information, the background to schemes that have successfully assuaged public concerns. Other problems have been discussed in the relevant sections of the report and Table 63 presents some of the action undertaken or required to remove or alleviate these constraints.

By far the most common solution suggested by respondents to the problems encountered was the provision of additional resources. This requirement is not, of course, exclusive to conservation grazing schemes but, in the absence of a large influx of money to nature conservation, does indicate that the demands made by grazing schemes must be weighed against alternative methods of achieving the conservation goals. Unfortunately this may on

occasions lead to the adoption of inferior, but less resource-demanding, methods than the use of grazing animals.

In completing this report we have become acutely aware of the problems of obtaining and keeping grazing animals and of the physical, legal and practical constraints on establishing and sustaining grazing projects. Readers be dismayed by the number of difficulties raised but we hope that this report will stimulate action from policy makers where it is needed, inform conservation managers and so make their decisions easier and more effective, and help the Grazing Animals Project contribute to the development of better conservation grazing schemes. Despite the difficulties there are many successful grazing schemes as the result of the hard work and dedication of numerous grazing managers. Although we are not yet able to give definitive answers to the many problems encountered, this report gives some guidance on the issues that need to be addressed if further success is to be achieved. We will undertake further analysis and research into the unresolved issues and work towards their resolution, but in the meantime we would encourage managers to continue their efforts and assure them of the continued support and assistance of GAP.