



Sheep Welfare

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Sheep breeding practices are carried out under extensive pasture conditions or intensive housing conditions in order to produce meat, milk and wool. Both breeding systems include many factors causing pain, suffering and distress and threatening the sheep welfare.

‘Life Worth Living’. Welfare is essential for ensuring the quality of the life of animals and expiration of their normal lifetime. It should be remembered that animals cannot talk and express their pains. Ensuring the quality of the life of animals is a criteria sought today for the breeding of farm animals. Pain is about distress and suffering and is the most crucial threat for animal welfare. Farms animals are exposed to painful illnesses, injuries and management methods negatively affecting the welfare in production systems. Distress means the physical and mental status of the animal when facing situations considered as a threat. Welfare, on the other hand, is the physical and mental situation of animals in the lack of negative emotions and existence of positive emotions. The welfare of animals means a life away from any undesired emotions such as pain, suffering and distress.

The pain of animals cannot be measured and compared with that of animals as they cannot talk. Pain in animals presents itself with physiological and behavioral changes. Physiological and behavioral responses are effective for measuring pain from less severe to extreme severe pain. The basic parameters for determining the pain of sheep are

- changes in heart beats,
- changes in eye temperature,
- changes in blood pressure,
- changes in behaviors and
- changes in the levels of some hormones and other materials in blood.
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The most significant resource for sheep is tail docking and castration. Sheep response to these pains with pains in abdominal region, abnormal standing and waling disorder. The level of plasma cortisol for the determination of pain with physiological changes is the best indicator. Cortisol is an important hormone with a vital significance in terms of response to



distress. Cortisol increases the blood pressure, increases the blood sugar and affects the immune system negatively. The lack of response to distress in animals is considered as an indicator of welfare.

The concept of welfare in animals has gained an international importance in recent years. That is because ensuring animal welfare is not only a duty that has to be performed legally and ethically but it should also be considered as a way of direct economic contribution to the enterprise. Today 5 elements are taken into consideration for the freedom of farm animals. There are as follows:

1. Freedom from hunger and thirst: Providing access to fresh water and a diet to maintain full health and vigour,
2. Freedom from discomfort: Providing an appropriate environment including shelter and a comfortable resting area,
3. Freedom from pain, injury or disease: Keeping animals away from pain, injuries and diseases by prevention or treatment,
4. Freedom to express normal behavior: Providing sufficient space, proper facilities and company of the animal's own kind,
5. Freedom from fear and distress: Ensuring conditions and treatment which avoid mental suffering.

The basic requirements for providing sheep with these freedoms both under pasture and intensive production conditions are:

- An adequate level of nutrition to sustain health and well-being of sheep,
- Access to sufficient water of suitable quality to meet physiological needs,
- Social contact with other sheep; a suitable environment where the sheep stay comfortably, live and extend their legs,
- Protection from predators,
- Protection from pain, injuries and diseases,
- Protection from extremes of climate,
- Necessary precautions for protection from natural disasters such as fires, floods etc.,
- Treatments that will not cause distress and pain in sheep.

Whatever the form of husbandry, owners, agents, managers, stock-persons and personnel directly working for sheep breeding have a moral responsibility and a defined legal responsibility to care for the welfare of sheep pursuant to legislation determined by the European Union. These persons are responsible for providing welfare in keeping conditions of sheep, ensuring their experiencing unnecessary pain and distress and preventing their being injured. Current experiences as well as scientific information are used for ensuring these and meeting the development, physiologic and etiological requirements of animal.

Researches carried out in Europe on sheep welfare mainly focus on castration and tail docking. Shearing, catching and slaughtering are also the main matters regarding sheep welfare. The important rules regarding these matters are the good management of these processes, appropriate handling of the animal, performance of these procedures in a way that cause the least pain and distress and training of the personnel to perform such procedures. Furthermore, diagnose of illnesses, vaccination and treatment are welfare matters of great

significance. The identification of common parasites in the region is also important. Shearing before lambing, weaning, sheep mating period and post period controls are the required controls in flocks for sheep breeding on pastures or in other breeding systems.

MAIN WELFARE MATTERS FOR SHEEP



1. FOOD, WATER AND DRAUGHT

The minimum standard for food in terms of sheep welfare is that sheep must be provided in all systems of management with access to a diet which is nutritionally adequate to maintain health and meet the appropriate physiological requirements for growth, pregnancy, lactation and to withstand cold exposure. The minimum welfare standard in terms of water is that sheep must have access to quality and sufficient supply of water. Where an adequate level of nutrition and water cannot be met, sheep should be moved to other areas, sold or humanely slaughtered.

Main nutrition issues regarding sheep welfare are as follows:

- The feed requirements of sheep should be satisfied both in terms of quantity and quality,
- Feeds should be free of toxic plants and other toxic materials that will threaten the health of the sheep,
- Feeds to be given to sheep should be free of any materials that will cause pain and injuries to sheep,
- Sheep should have access to feed appropriate to their physiological needs at least once a day,
- Feeding and watering equipment should be designed in a way that will prevent the contamination of food and water and competition between sheep,

- No other similar chemical substances, with the exception of those given for therapeutic purposes, should be administered unless scientific studies of animal welfare are carried out or it has been demonstrated by established experience that such substance is not detrimental to the health or welfare of the animals,
- Sudden changes in the type and quantity of feed should be avoided,
- Feed should be fresh, palatable and of good quality. It is especially important not to store silage for long periods and to prevent its deterioration,
- The use of high intakes of cereal-based diets requires a gradual introductory feeding period and during which a suitable high-fiber concentrate should also be fed.
- Mineral premixes should be designed to avoid urinary problems such as urolithiasis in male animals,
- Certain trace minerals, in particular copper, can be harmful to sheep when confronting other types. Mineral preparations and compound feeds unsuitable in terms of copper should not be used and shepherds should have knowledge on these matters,
- Sheep owners and shepherds should examine the teeth structure of the herd, have the problematic teeth structures be corrected and maintain the body conditions,
- Precautions should be taken to provide feed of sufficient quantity and quality in emergencies such as serious winter conditions or summer droughts.

The following should be taken into consideration for water issues regarding the welfare of sheep:

- Sheep should be provided with fresh water enough for their daily needs in pastures or stockyards,
- Ideally the animal should always have access to water. Water is especially important for sheep on lactation. The water drunk by the animal from feeds including rooted and tuberous plants should not be considered enough,
- Water supply should have enough capacity and the quality and quantity of water should be regularly checked,
- Watering equipments should be regularly controlled and controls should be carried out more when hot,
- Water quality should be suitable for protecting the health of sheep, drinking waters with salt at toxic level or other harmful materials should be controlled and should not be used without minimizing the harmful effects,
- Sheep should not be deprived of water more than 36 hours and this term should be lower when hot,
- Watering points should be located within the normal travel range of sheep,
- Where sufficient water to maintain health cannot be provided, the sheep should be moved to other areas where an adequate supply is available, sold or humanely slaughtered.

Drought is defined as severe food and/or water shortage following prolonged periods of abnormally low rainfall. It is not a normal seasonal decline in the quantity and quality of food available. Drought may sometimes cause problems in terms of sheep welfare during summers. Recommended practices are as follows:

- Sheep owners and their advisers should make their plans for not being affected by drought by taking also into consideration the sheep welfare,
- Drought feeding of sheep should start 2 to 3 weeks in advance before the feed is finished,
- Thin sheep should be subject to special care in case of drought,
- Precautions should be taken as the stress increases in the event of droughts,
- If sheep are unable to rise and walk, they should be humanely destroyed; if they are still able to walk, they should be sent to the nearest slaughtering plant but not to sale yards,
- Where minimal water and food requirements cannot be met, sheep should be sent for slaughter or humanely destroyed,
- Sheep should be protected from cold and humid air like from drought.

2. SHELTERING AND PROTECTION FROM CLIMATIC EXTREMES



All steps should be taken to minimize the effects of weather that produces either heat or cold stress in sheep. Recently shorn sheep and new born lambs are particularly susceptible. Wind breaks, brushes and artificial equipments are required for minimizing the effects of the cold. Measures should be taken on pastures and stockyards to protect the sheep from fires, floods, injuries, illnesses and predators. Suitable lots, shelters, feeding and watering equipments should be provided for sheep.

Main welfare issues regarding the sheltering of the sheep and their shelters can be categorized under 4 titles:

- a. Sheep should be provided with sheds maintained with good care, having dry beddings and good drainage.
- b. Ill and injured animals should be kept under suitable care conditions and dry and comfortable beddings should be provided if required.
- c. Current experiences and scientific information should be taken into consideration while referring to the freedom of movement of sheep. Conditions that may cause pain and injuries in these areas should be eliminated.
- d. Areas complying with existing experiences and scientific data and suitable to the physiological and etiological requirements of the animal.

Other matters regarding the shelters for the sheep welfare are as follows:

- Keeping sheep in shelters in winters increase the welfare while problems may arise due to the crowdedness in terms of illnesses and welfare. Welfare recommendations should be taken into consideration while building sheep shelters and suitable movement and sleeping areas should be provided,
- Instinct behaviors of the sheep are limited when the sheltering system is not enough. Therefore, sheep should be supervised,
- Sheep welfare should be taken into consideration while planning the equipments inside the shelters,
- Dry, clean and comfortable conditions minimize the footrot and hygiene problems of sheep. Fresh and new beddings should continuously be provided during lambing.

Table 1. Sheltering conditions offered for the welfare of sheep (Sevi et al., 2009)

Parameters	Recommended values
<u>Space Allowance:</u>	
Young animals (15 - 25 kg body weight)	0.60 m ² /head
Young animals (25 - 40 kg body weight)	1 m ² /head
Ewe	1.5-2.0 m ² / head
Ram	2.2-2.5 m ² / head
Feeder space	0.2 m/ head
Airspace (adult animals)	7 m ³ / head
<u>Ventilation rate:</u>	
Young animals (summer)	35 m ³ /h/ head
Young animals (winter)	20 m ³ /h/ head
Adult animals (summer)	70 m ³ /h/ head
Adult animals (winter)	45 m ³ /h/ head
Air temperature	5-25 °C
Relative humidity	≤70 %
<u>Noxious gases:</u>	
Ammonia	< 10 ppm
Carbon dioxide	< 2500 ppm

2.1. Ventilation

Air circulation, dust levels, temperature, relative air humidity and gas concentrations shall be kept within limits which are not harmful to the animals. Effective ventilation of buildings is essential as sheep are particularly susceptible to respiratory diseases. Properly designed ventilation will permit the free circulation of air above sheep height and avoid draughts at sheep level.

2.2. Buildings and Equipments

Materials used for the construction of accommodation, and, in particular for the construction of pens, cages, stalls and equipment with which the animals may come into

contact, shall not be harmful to them and shall be capable of being thoroughly cleaned and disinfected.

Other welfare matters regarding the buildings and equipments are as follows:

- Sharp edges that may endanger the safety of sheep in buildings and equipments should be well planned,
- Internal surfaces of housing and pens should be made of materials which can be easily cleansed and disinfected,
- Surfaces should not be treated with paints or wood preservatives which may cause illness or death,
- All floors should be designed so as to avoid discomfort, stress or injury to the sheep,
- Solid floors should be well-drained and the sheep provided with dry bedding.
- Newly born lambs should be provided with suitable bedding,
- Water bowls and troughs should be constructed and sited so as to avoid fouling and to minimize the risk of water freezing and they should be checked at least once daily,
- Troughs should be designed and installed in such a way as to ensure that small lambs cannot get into them and adequate feeding space should be provided to the sheep. This varies according to the size of the sheep. Excessive competition affects the feed consumption negatively.

2.3. Fencing

Fences should be well-maintained so as to avoid injury to sheep. They should especially be suitable to horned sheep and more attention should be paid to lambing fields. The discomfort caused by the electric fences should be eliminated and attention should be paid to horned sheep when electric fences are used.

2.4. Lighting

Where animals are kept in a stockyard, adequate lighting whether fixed or portable shall be available to enable them to be thoroughly inspected at any time. Animals kept in buildings shall not be kept in permanent darkness for welfare issues. The natural light available in a building is insufficient to meet the physiological and ethological needs of any animals. Therefore, appropriate artificial lighting should be provided. Animals kept in stockyards shall not be kept without an appropriate period of rest from artificial lighting. The level of natural lighting during the hours of daylight should be at a level that enables the shepherds to easily see all sheep.

2.5. Space Allowance

The space allowance and group size for housed sheep should be determined according to age, size and class of livestock. The following examples of current good practice, with adequate ventilation and well-bedded on straw indoors, are set out below.

2.6. Mechanical Equipments

All automated or mechanical equipment essential for the health and well-being of the animals shall be inspected at least once a day to check there is no defect in it and where defects are discovered, these should be rectified. Alternatives should be developed for equipments such as ventilation, feeding, watering etc. if the equipments are defected. All



equipment and services including water bowls and troughs, ventilating fans, heating and lighting units, milking machines, fire extinguishers and alarm systems should be cleaned and inspected regularly and kept in good working order. These checks can be performed by the shepherds. All electrical installations should be safeguarded from rodents and the safety of the sheep should be ensured.

2.7. Fire and Other Emergency Precautions

Farmers should make advance plans for dealing with emergencies such as fire, flood or other events and should ensure that all staff are familiar with the appropriate emergency action. Design advice is important when constructing or modifying a building. There should be provision for livestock to be released and evacuated quickly in the event of an emergency. Consideration should be given to installing fire alarm systems which can be heard and acted upon at any time of the day or night. Expert advice on all fire precautions can be obtained from local firefighting or fire prevention institutions.

2.8. Hazards

Sheep should be prevented from getting harmed by fences and traps. As far as is practicable, precautions should be taken in places where sheep may be buried by snow and should be shepherded into safer areas. All sheep should be removed from areas that are in imminent danger of flooding. Young lambs should be protected, as far as possible, from hazards such as open drains and predators. Any dog which is a potential hazard to sheep should be kept under control and well-trained sheepdogs, should be used for this duty. Sheepdogs should be well cared for and should be regularly vaccine and other precautions should be taken.

3. HEALTH



Health programs includes keeping of records containing the basic data of the flock. This program includes vaccination policy and timing, internal and external parasite control and foot care. Pasture care is also another control way for illnesses and suitable medicines should be used especially for internal parasites and nail rots Record should include the number of the dead animals determined with each treatment and medical treatments. These records should be used at least 3 years.

The following should be carried out for health regarding sheep welfare:

- Care takers should regularly supervise sheep to avoid any suffering.
- Any animals which appear to be ill and injured should be cared for without delay and where they do not respond to such care, veterinary advice shall be obtained as soon as possible,
- Shepherds should be experienced or trained for the health and welfare of sheep. Such skills should include vaccination, prevention of footrot and treatment of lame sheep, prevention and treatment of internal and external parasites, tail docking and castration.
- Vaccination and treatment and prevention processes for external parasites should be carried out with the recommendation of the manufacturing firm,
- Appropriate protective measures should be taken if there is an illness in any region or any flock,
- Particular attention should be paid to flocks including rams. Introduction of a ram to an established flock can cause the illnesses to spread. Such ram and sheep should be segregated for at least four weeks and inspected and treated, if necessary, for diseases such as sheep scab or footrot,
- Before introduction of rams to a flock at tupping time, ewes should be checked for fitness (especially for lameness, teeth, udders and body condition) and should be culled. Ewes which are substandard should be culled together with any known to have suffered reproductive problems in previous seasons. Rams should also be checked for their suitability for breeding.

- A written health and welfare programme for all animals should be prepared for each flock. This should cover the yearly production cycle. It should be developed with appropriate veterinary and technical advice, and reviewed and updated annually.



3.1. Inspection

The health and welfare of animals depend upon regular supervision. Shepherds should carry out inspections of the flock at intervals so that signs of injury, distress or illness or infestation can be recognized. The frequency of inspection is important for minimizing the problems of the sheep. Thus, the inspections should frequently take place.

3.2. Condition Scoring

Sheep farmers and shepherds should be aware that the use of condition scoring can contribute significantly to good husbandry. Condition scoring is an easy technique to learn and allows the body reserves of individual sheep to be assessed quickly. The information gained enables high standards of husbandry to be achieved and can prevent a welfare problem from developing. This technique enables the identification of animals requiring special care. For example, a condition score of 1.5 - 2 can indicate inadequate management conditions.

3.3. Lameness

Lameness in any animal is usually an indication of pain. Lameness in sheep is one of the most common signs of ill health and discomfort in the flock. This affects the welfare and productivity negatively. A significant percentage of sheep with chronic lameness may be indicative of poor overall welfare standards within the flock.

The following should be done for lameness:

- Lameness can originate in the feet or joints. Frequent inspections should be made for the correct diagnosis and a suitable program for prevention and treatment should be implemented.
- An effective foot care programme will include regular inspection of the sheep's feet. It may also necessitate careful paring, treatment of infected feet and footbathing with a suitable solution, which is maintained at the manufacturer's recommended dilution and, where appropriate, vaccination.
- Foot paring is a skilled procedure and can damage feet if carried out incorrectly or excessively.
- If a chronically lame sheep does not respond to remedial treatment, it should be culled and not left to suffer.
- Such animals should not be transported in order to avoid suffering, consigned to market and humanely slaughtered on the farm.

3.4. External and Internal Parasites

Where external parasites are likely to occur, sheep should be protected by dipping or by the use of an effective preventive chemical agent. Where sheep are clinically infected with such external parasites, effective treatment must be given without delay.

Internal parasites should be controlled by grazing management and/or anthelmintic treatment. Advice on steps to avoid the development of anthelmintic-resistant worms should be sought from a veterinary surgeon.

3.5. Illnesses and casualties

Injured, ailing or distressed sheep should be identified and treated without delay. Where the shepherd is able to identify the cause of ill health, he or she should take immediate remedial action and when in doubt, veterinary advice should be obtained as soon as possible. Moreover,

- Sick and injured animals should be segregated and treated and unfit sheep should be removed from flocks.
- If an unfit sheep does not respond to treatment, it should be culled or humanely killed.
- In an emergency, it may be necessary to kill an animal immediately to prevent suffering. In such cases, the animal should be destroyed in a humane manner and, where possible, by a person experienced for killing sheep. The equipments used for killing should be suitable for killing.
- If animals are killed other than in an emergency, the operation may only be carried out using a permitted method and in accordance with current welfare at slaughter legislation.
- Sick sheep should only be moved for veterinary treatment or taking to the nearest slaughtering facility. No other distress should be caused to the animal during movement.

3.6. Vaccination and Dosing

Care should be taken to ensure that all equipment used in dosing, vaccination and treatment is maintained to a satisfactory standard. Equipment used for any injections should be frequently cleansed and sterilized. Ideally, disposable needles should be used. Dosing gun nozzles should be of a size suitable for the age of the sheep. Hazardous objects such as needles should be disposed of safely in accordance with current legislation. Where necessary, the shepherd should receive training in the use of equipment.

4. MANAGEMENT

Good arrangement of practices regarding care and management at farms may decrease the stress, pain and discomfort experienced by the animal. The practices that may cause pain should be rendered to minimize the pain and practical alternatives should be developed.

- All fields and buildings should be kept clear of debris such as wire or plastic, which could be harmful to sheep.
- When sheep are outdoors in winter, and particularly when fed on root crops, they should be allowed to a straw bedded area and artificial shelter should be provided where there are not any natural shelters.
- Animals not kept in buildings shall, where necessary and possible, be given protection from adverse weather conditions, predators and risks to their health and shall, at all times, have access to a well drained lying area.
- Management procedures carried out on sheep should be performed by competent persons.
- Relevant hygienic precautions should be undertaken in all surgical operations.
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4.1. Stockmanship and Supervision

Flock owners, responsible flock officers, veterinaries, flock employees and shepherds are responsible for animal welfare in sheep breeding. Sheep should be cared for by a sufficient number of staff, who possess the appropriate ability, knowledge and professional competence on farms.

- The most significant single influence on the welfare of any flock is the shepherd, who should carry out an effective routine for continuing care.
- All shepherds should be aware of the welfare needs of their sheep and be capable of safeguarding the flock. They should be trained where required.
- Shepherds should know the signs of good health in sheep. These include free movement, active feeding and rumination, and absence of lameness, visible wounds, abscesses or injuries.
- Shepherds should also know the signs which indicate ill health in sheep. These include abnormal posture, lameness, scouring, coughing or panting, rapid loss of body condition, excessive wool loss, sudden fall in milk yield and being apart from the flock.
- The capabilities of the shepherd in charge of the sheep are a significant factor in determining the size of a flock. The flock size should not be increased unless the shepherds have the skills necessary.
- It is important for a farmer to ensure that enough time is available within the shepherd's normal work routine for the flock to be properly. Shepherds need extra help while lambing, shearing, routine dipping and other disease prevention treatments.
- Flock owners and advisers should be frequently inspected for the health and welfare conditions of sheep.
- Sheep in the buildings should be checked every day by the experienced personnel and they should be treated in terms of their injuries, feed and water consumptions, illnesses and pain.
- The frequency of inspection for sheep flocks kept under extensive conditions and pastures changes according to the flock size, feed procurement situation, pregnancy, climatic conditions and management applications.

4.2. Handling

All sheep farmers should have easily operated and efficient handling pens, to facilitate routine management and treatment. Especially floors should be maintained in good repair and should not have any sharp edges or projections, which might injure sheep.

Good sheep management equipments and easy familiarity of animals with the same are important for the sheep welfare. For this purpose,

- When new sheep yards are to be constructed, or existing yards modified, expert advice should be sought.
- The floors of sheds and yards should have surfaces that minimize the risk of injury and disease and allow sheep to stand and walk normally.
- Passageways, races, entrances and exits should be designed to take advantage of the behavior patterns of sheep.
- There should be equipments in the yards for the feeding and watering of sheep.
- Catchers should handle the sheep gently for inspection or guiding to another place. This may help decrease personal stress.
- Sheep should be moved quietly through yards with the minimum forcing by dog or person.
- The use of dogs and goading devices for handling sheep should be limited to the minimum and dogs should be effectively prevented from biting.

- When sheep are to be transported, well-designed collecting, loading and unloading facilities should be available on the farm. It is helpful if the sheep are familiar with these handling pens in order to minimize stress levels.
- Sheep should not be caught by the fleece alone. They should be handled or restrained by means of a hand or an arm under the neck (holding the neck wool, if necessary) with the other arm placed on or around the rear. Lifting or dragging sheep by the fleece, tail, ears, horns or legs is unacceptable.
- Materials suitable for handling should be used in a way to avoid causing injury or discomfort. Tethering by the horns is unacceptable.

Artificial rearing and handling of lambs by humans before the first 10 days of their lives ensure better tendency to humans in future periods. Sheep may differentiate between their care takers and other people. The presence of their care takers cause calming down under stress conditions. Patting and touching on the slaughtering line decreases the discomfort caused by the slaughtered sheep.

4.3. Shearing

It is normal practice to shear sheep annually. Additional shearing be required at other times of the year. Shearing may be required to reduce the risk of fly strike. However, removal of fleece of each adult sheep annually is important in terms of welfare.

The matters that should be taken into consideration during shearing in terms of sheep welfare are as follows:

- Because shearing is stressful for sheep, undue handling and exposure to adverse weather of sheep should be avoided.
- Sheep should be returned to food and water as soon as possible after shearing.
- Shearing is a stressful method due to the noise, hotness and contact of the shearing tools. Shearing should be fast and careful and the injuries on the skin should be treated.
- Shearers should be experienced, competent and have received adequate training in shearing techniques.
- Shearers and all contractors should clean and disinfect their equipment, clothes and boots between flocks to minimize the risk of spreading disease.
- Winter shearing is not a suitable practice unless the sheep are housed.
- If the animal are to be slaughtered after shearing, the slaughtering should start within 2 hours after the shearing and shall last not more than 24 hours.

4.4. Weaning

Early weaning of sheep before 28 days affects their immune responses and performance negatively. The recommended age for weaning is the age of 3 months without any stress. The methods recommended for weaning are full separation, separation at short intervals or separation with gradual intervals starting from the age of 4 weeks. Scientific researches show that weaning after 3 months is not stressful and can be applied.

4.5. Dipping

Dips or showers should be constructed and operated in a manner that minimizes injury, disease and stress to sheep.

4.6. Use of Dogs

The use of dogs and goading devices for handling sheep should be limited to the minimum needed to complete the procedures. Dogs that bite should be effectively muzzled while working and restrained when not working.

4.7. Artificial Rearing

Artificial rearing of lambs requires suitable supervision and stockmanship. However, It is essential that all lambs should start with an adequate supply of colostrums.

- All lambs should receive an adequate amount of suitable liquid feed such as ewe milk replacer, at regular intervals each day for at least the first four weeks of their life. From the second week of life, lambs should also have access to palatable and nutritious solid food and always have access to fresh, clean water.
- Lambs should be trained in using automatic feeding equipments and such equipments should be controlled daily.
- Troughs should be kept clean and any stale feed removed. Equipment and utensils used for liquid feeding should be thoroughly cleansed and sterilized at frequent intervals.
- A dry bed and adequate draught-free ventilation should be provided for lambs.
- Where necessary, arrangements should be made to supply safe supplementary heating for very young lambs.
- Suitable accommodation should be available for sick or injured lambs. This should be separate from other livestock.
- Where young lambs are being reared at pasture without their mothers, care should be taken to ensure that they have adequate shelter.

4.8. Breeding Management

The body condition of the ewe and ram prior to tugging have a marked effect on the ovulation rate and eventual litter size. Farmers and shepherds should have good knowledge on this matter. The use of PMGS hormone in sheep should be performed without affecting the sheep welfare. Tubbing and lambing periods are the periods when the sheep welfare is under stress. Housing or shelter should be provided when lambing is to take place in adverse weather conditions.

- Any person using artificial insemination should be trained and competent in the technique.
- Laparoscopic artificial insemination is a surgical technique which must be carried out only by a veterinary surgeon using an anesthetic.
- Treatment of ewes using hormones to produce multiple embryos and subsequent embryo transfer must be carried out only by a veterinary surgeon. Embryo transfer is an act of veterinary surgery.

4.9. Pregnancy, Lambing and Orphan Lambs

The last 6 weeks of the pregnancy, lambing period and 6 weeks after lambing totaling to 12 weeks are the most important period in sheep husbandry. The following should be performed for ensuring welfare during this period:

- Ewe flocks lambing under grazing conditions should be disturbed as little as possible.
- Sheep with pregnancy problems should be checked at least once a day and toxemia should be followed.
- Access to a sheltered paddock is recommended for lambing ewe flocks, if the risk of bad weather at lambing is high. Lambing sheep should be kept under shelters.
- The nutritional management of pregnant ewes is particularly important. Both condition scoring and scanning can be of benefit. Pregnant and nursing ewes should receive adequate food to ensure the development of healthy lambs and to maintain the health and bodily condition of the ewe.
- Barren, single, twin and triplet bearing ewes should be identified with scanning to be managed as separate groups.
- Heavily pregnant ewes should be handled with care to avoid distress and injury, which may precipitate premature lambing.
- However, if a heavily pregnant ewe requires treatment, such as for lameness, she should receive appropriate treatment which is not left untreated until after lambing.
- Care should be taken to increase the number of ewe mortalities occur during the period around lambing.
- Lambing pens, sufficient in number and size, should be easily accessible and on a dry, well-drained site. Each pen should be provided with a hay rack, feed trough and water bucket.
- Any ewe with a prolapse should be treated immediately and, where necessary, veterinary advice should be sought.
- Every newly born lamb should receive colostrum from its dam, or from another source, as soon as possible and in any case within three hours of birth.
- Where lambing takes place outdoors, some form of shelter or windbreak should be available.
- The problem of mis-mothering, which occurs particularly during gathering, handling, transport or dipping of ewes and lambs, should be reduced by keeping group size to a minimum.
- Non-toxic color markers may be used for identifying lambs and ewes.
- It is also an offence to cause lambs with unhealed navels to be transported to, or exposed for sale.

Where orphan and stray lambs can be identified, they should be given attention. Fostering is a realistic option; especially on small farms. These sheep will need colostrum or colostrum substitutes, then milk on a regular basis and warmth and shelter should be provided. Weak lambs with very little chance of survival should be destroyed humanely.

4.10. Transportation

Transportation is an important stress resource for sheep. Heart rates and blood cortisol levels increase. Loading from a lamb or use of lifts cause equal stress. Wide space allowance during transport increases the stress as slipping and balancing in the vehicle when crowded decreases. This increases during braking or shifting gears.

Stress and dehydration decreases if feed and water are provided to the sheep during transportation. Provision of 8 hours for feeding and watering after 24 hours of transportation should be enough for treatment. Vehicles should be stopped for food and water after every transportation of 15 to 24 hours under any condition.

If the sheep are to be kept for some time for slaughtering after transportation, feed and water should be provided, sheep should rest and provided with a suitable place and shed.

Being in their own social groups decreases the stress during rest. The matters regarding the transportation of sheep in EC regulations are as follows:

- Sheep should not be injured and unnecessarily slaughtered,
- Sheep should be available for transportation,
- Sheep should be transported and maintained by capable persons,
- Sheep should be provided with rest, feed and water during transportation.

Good planning of the transportation of sheep is the most important matter affecting the animal welfare. Therefore,

- Sheep and vehicle should be determined for transportation,
- Transportation time should be estimated,
- Adequate space should be allowed to the animals in the vehicle,
- Urgent brake and gear changes should not be made,
- The temperature and the concentration of the gases should be checked during transportation via sheep or box vans,
- Animals should be supervised and rested and provided with food and water during transportation,
- Adult sheep not lactating should be provided with water at least every 12 hours and lactating young animals every 8 hours; at least 4 liters of water should be calculated per sheep and this should be increased twice under hot weathers.
- Adult animals should not be kept without food for more than 24 hours and young animals for more than 12 hours, hay should be provided to sheep based on dry materials up to 2% of their body weight (1 kg of dry material for a sheep of 50 kg).
- Sheep to be transported should be checked for illnesses.
- Open-boarded transportation vehicles should be used, however the heads and legs of sheep should not go through or over such plates,
- Protection from wind and rain should be provided,
- The transportation rate should be neither low nor high. The transportation rate to be used on the vehicle should be as follows:

Table 2. Space requirements for transportation of sheep

Body Weight kg	Space Allowance m ² /head	Number of sheep head/m ²
20	0.14	7
30	0.17	6
40	0.21	5
50	0.26	4
60	0.31	3

- Horned sheep and sheep of different sizes and in different physiological periods should be transported separately,
- Pregnant sheep should be carried in separate pens,
- Nursed lambs should be transported with their ewes,
- Shorn sheep should be transported after 3 days at the earliest,
- Veterinary advice should be taken for the transportation of sheep in early pregnancy, in 1/3 of their pregnancy period and which gave birth,
- Sheep to give birth should not be transported,
- Food and water should be provided to pregnant sheep before and after the loading and 12 hours of resting after each transport lasting 10 hours.
- These sheep should be inspected 30 minutes after the commencement of transport and then every 2 hours.
- Injured and stress animals should be help and those with severe injuries should be slaughtered and disposed.
- In cases of emergency illnesses and injuries, sheep should only be transported to short distances and for veterinary inspection. These animals should be transported for slaughtering if there is a valid veterinary certificate.



4.11. Welfare in Sheep Markets

The things required to be done for achieving high standards in terms of sheep welfare in markets:

- Welfare friendly equipments should be provided in market places,
- Animals should be handled in a friendly, calm and careful way and cages should be well-organized,

Feed and water should be provided to sheep in market places,

- A bell should be hanged to the leader ship,
- Lambs younger than 4 years brought together with the sheep should be sold in cages and stay in the market place for maximum 4 hours,
- Shelters should be provided to lambs standing near their mothers.

4.12. Transgenic Sheep

Transgenic sheep should not be mixed with other when kept on pastures or housed in buildings. It is found out that transgenic sheep carry alpha-1 antitrypsin factor. Transgenesis changes the behavior of the animal. However, the negative effects on the animal cannot be determined. The dangerous effects of transgenesis are related with the special gene transferred. Therefore, the welfare conditions for each new transgenic animal should be developed.

5. HUSBANDRY METHODS and SMALL SURGICAL OPERATIONS



Ear marking, tail docking, castration, mulesing, horn trimming, paring of feet, pizzle dropping and slaughtering cause stress and pain for sheep and affect the sheep welfare. Attention should be given to the sheep welfare from the beginning of catching the sheep until the end of treatment process. The following should be taken into consideration:

- The place of operation should be suitable and the contamination of illnesses and parasites from the environment and feces should be minimized.
- The type and degree of restraint is important in terms of welfare.
- Instruments should be adequately maintained and sterilized prior to use. They should be sterilized again after the operation.
- Protections precautions should be taken before any operation against tetanus.
- Stock managers should be trained in all surgical husbandry procedures or experienced operators and veterinaries should be employed.

5.1. Ear Marking

All sheep should be marked with a registered ear tag before the age of 6 months. Ticks, tattoos, labels or cutting the ears are used for other identification methods. Electronic methods are also accepted. Electronic devices may be used. These could be considered:

- Permanent marking of sheep by, for example, ear tattooing or tagging, should be carried out only by a skilled stockman using properly maintained instruments.
- If horned breeds of sheep are to be marked for flock management purposes, horn branding is to be preferred.
- Ear tags are suitable for sheep and Ear marking instruments should be sharp and the cutting edges complete so as not to cause tearing of the ear.
- Ear tags may cause injuries and infections in sheep. The form of the ear tag is important in injuries. Knotted tags cause less injuries. The smallest injuries are caused by two-piece materials made of polyurethane.

6.2. Tail Docking

Today tail docking and emasculation is discussed increasingly in terms of sheep welfare. Pain and stress should be decreased during this procedure for moral values. Tail docking is a good health management procedure. It is a standard procedure in Europe. 25% of sheep population is fat-tail or fat-rump in the world. Tail docking is suitable for these breeds. 10% of sheep is hair sheep and does not have tails. Most of Northern European breeds (3% of world's sheep population) have small and thin tails and do not require tail docking. Tail docking may be undertaken where there is significant risk of faecal and urine contamination and/or flystrike. Tail docking is a management practice that should be performed on sheep early for welfare. It should be performed preferably between 2 and 10 weeks. Etching should be performed for sheep between 10 to 20 weeks and anesthetics should be used after 6 months. Tail docking is performed on females (but not on males) in some flocks. It is not much performed in intensive breeding systems. Elastrator (rubber ring), etching, emasculator and cutting with a sharp knife are the accepted methods for tail docking. Elastrator is a bloodless methods and stops the transfer of blood to the tail and the tail gets dry and drops. Measures should be taken for tetanus with rings. Emasculator is based on grinding and cutting

and performed with burdizzo pincers. Etching with hot iron and similar tools warmed with electricity are more humane according to the researchers and is followed by elastrator.

- Use of etching method causes the least change in the behavior and cortisol level of blood of the animal but is not preferred due to chronic infections.
- Pain relief can be ensured with rubber ring method. Use of both rubber and burdizzo pincers methods decreases pain only when compared to use of ring.
- Tail docking without the use of anesthetics should be performed as soon as possible. Tail docking should not be performed on lambs older than 6 months.
- If required, tail docking and castration should be performed simultaneously. This may prevent mismothering and distress.
- The docked tail should be just long enough to cover the vulva in female sheep and be of similar length in the male and should not be too short. Short tails are much more tend to rectal prolapse when fed with concentrate feed.

5.2. Castration

Castration is performed to protect the flock from early and unintended pregnancies. It can be performed on both the male and female. This eliminates the aggressive male behaviors in pastures and feeding. Moreover, it is easier to slaughter castrated lambs than rams. Farmers and shepherds should consider carefully whether castration is necessary within any particular flock. Castration may be unnecessary if lambs are to be marketed for slaughter prior to puberty or at an age of 3-6 months. Therefore, castration should be preferred if the lambs are to be kept in the flock after puberty. Elastrator, emasculator, surgical and cutting methods are used for castration. Surgical method causes the least stress. However, the sheep should be protected against infection risk. Cutting, elastrator and emasculator are the castration methods accepted for male lambs without anesthesia. Castration and vasectomy of lambs over six months of age should not be performed without the use of an anesthetic. Despite not being a less painful method, rubber rings maintains its popularity. Epidural anesthetics used for decreasing the pain are not effective in decreasing the pain. Use of local anesthetics with rubber rings decreases the pain. Anesthetics should be applied to the length of scrotal. Use of ring and emasculator method together may also decrease the pain.

- Castration should be performed as soon as possible and preferably before the 10th week according to the management situation.
- Rubber ring method is more suitable for small lambs.
- Castrators designed merely for lambs should be used in emasculator method.
- Rubber ring or rubber ring + emasculator methods are allowed generally for the age of 24 hours - 10 weeks.
- Castration should be performed with rubber ring + emasculator for the age of 10 to 20 weeks and local anesthetics should be used for the castrations after 20 weeks by a veterinary surgeon.
- Castration should be performed by authorized and trained persons.
- Castration should only performed by a veterinary surgeon by using a suitable anesthetics for lambs older than 3 months.

- It may be performed without using elastrator and emasculator anesthetics in the first week.
- Account should be taken of the pain and distress caused by gathering and handling of lambs, and the potential risk of infection during castration.
- For very young lambs gathered in large groups, there is a real risk of mismothering, which may lead ultimately to starvation and death.

5.3. Vasectomy, Electro-Ejaculation and Electro Immobilization

Semen is routinely collected through electro-ejaculation for diagnostic purposes. Sheep demonstrate aversion to shearing, followed by electro-ejaculation. Therefore, the recommended methods should be used for sheep welfare. For instance, ventrally positioned probes can be used. Such may provide mild sedation and give a rest period between collections. The electro-immobilization of sheep is prohibited. Vasectomy or electro-ejaculation may be carried out only by a veterinary surgeon.

5.4. Teeth Care and Trimming

These procedures do not have any beneficial effect on health and care conditions of the animals, but do have the potential to cause significant pain. Corrective dental procedures on individual sheep may be undertaken to if considered to be beneficial to its health. That is because there is limited published scientific evidence that either teeth grinding or trimming have any positive effect on the health, care conditions or productivity of individuals. However, in aged sheep, corrective procedures such as the removal of loose teeth, particularly incisors, may prove beneficial. Teeth trimming of sheep is prohibited by laws in some countries.

5.5. Care and Paring of Feet

Sheep which have poor hoof conformation, or are habitually on soft ground, may require regular foot paring. Problems of feet are the most important source of pain in sheep and affects the welfare of the animal negatively. Sheep affected with foot disease may need to have diseased tissue pared away by a sharp instrument. The paring should be kept to the minimum necessary to remove affected tissue and should not result in bleeding or severe lameness. Paring may not be indicated in sheep with feet affected by foot abscess. Control or eradication procedures should be adopted if evidence of foot rot occurs.

5.6. Horn Trimming

The horns of rams and sheep may need to be cut back to avoid injury from an ingrowing horn or to other sheep. This method is important for sheep welfare. The amount of horn removed should be limited to avoid damage to soft horn tissue and associated bleeding. Complete permanent dehorning should only be undertaken under general anesthesia. Elastrator and etching methods should be used for horn trimming in lambs.

5.7. Pizzle Dropping

Pizzle dropping is sometimes performed to reduce pizzle rot, wetting of the belly wool by urine and resultant flystrike in the region of the pizzle. The need for this operation should be considered according to the risk of pizzle rot and pizzle strike. Information should be sought on the correct procedure. It should be performed only on lambs less than three months of age and such lambs should be checked regularly for signs of fly-strike of the wound, and infested wounds should be treated without delay.

5.8. Slaughter Procedures

The main welfare rule for slaughter is that the method of slaughter should be effective and humane, causing sudden and painless death for the sheep. The animal must be handled quietly beforehand to ensure it is not unnecessarily distressed or alarmed. It must be stunned with a fire-arm or captive bolt penetrating stunner followed by bleeding out. The stress caused to sheep before and during the slaughter affects the carcass quality. When put to sleep, the skin is recommended to be wetted. In order to ensure welfare, the handling and slaughtering of the sheep requires that the person to perform the slaughter should have a license, that there should be an authorized person in every slaughtering place in order to protect the welfare of the sheep and that allowed methods for stunning and slaughtering of the sheep should be used. Putting to sleep for slaughter is a recommended practice for welfare. The most widely available method of putting sheep to sleep is the fire-arm method, a gunshot to the brain from close range. For the welfare of sheep while using this method, the head of sheep should be kept stable and the level of shock is also crucial. This method may be dangerous for the personnel applying the method. The other method is the use of captive-bolt penetrating stunner (pistol) and the concussion stunner is not recommended in terms of welfare. The clubbing method is based on rendering of by a heavy blow to the back of the head stunned and unconscious before slaughtering. This should be followed by slaughter. Fire-arm or captive-bolt stunner should be preferred for welfare while laying the sheep on their side.

Slaughter should be as fast as possible and in a way not causing distress to the animal. The animal may be slaughtered by laying it on its side in case of emergencies. Two carotid arteries and trachea should be cut just behind the jaw bone and the neck should not be broken.

6. WELFARE OF DAIRY SHEEP

Dairy sheep husbandry is generally performed more in intensive systems than the traditional herds. Thus, there are some differences regarding the welfare of these sheep both in terms of management and milking.

Welfare issues regarding husbandry and management:

- Sheepmen should have good knowledge on the special problems of dairy sheep herds and the ways to protect from the same.
- Some dairy sheep breeds are very sensible especially to foot problems. The breeding systems used in the places where the sheep are housed may increase the number of these problems. Required arrangements and health disinfections should be performed on the roads, the entrances and exits of the stockyard and milking places.
- Routine measures must be taken in order to prevent foot problems. However, if medicines are used, the periods of use of such should be checked.
- The feed and water needs of dairy sheep are higher, a sufficient level of feed and water should be provided in pastures or stockyards.
- A minimum space allowance of 0.7 m²/head, when animals are kept on straw litter, and of 1 m²/head when sheep are on slatted floor should be provided for sheep weighing no more than 60 kg. Space allowance should be increased by about 30% for sheep weighing from 60 to 90 kg. This space should be increased by further 30% during suckling of lambs. 2 m² of area is assigned per sheep in paddocks.
- Space allowance can be reduced by 10% for recently sheared sheep.
- Ventilation plays a major role in terms of welfare and temperature and humidity affects the performance of the dairy sheep in a more negative way.

Main welfare issues regarding milking and milking equipments:

- Special attention should be paid to milking techniques, the setting of milking equipments and milking hygiene.
- The milking should be performed daily and regularly at same hours. Attention should be paid to the disinfection of udders and the udders with problems should be treated.
- Careful handling and inspection of first milk are some of the good milking practices.
- The milking place should be well designed and no injuries and distress should be caused to sheep.
- Milking machines should be regularly controlled and disinfected and attention should be especially paid to vacuum and pulsation rates of the milking unit with regard to welfare.
- The sheep welfare is affected not only by the vacuum level used for milking but also its stability. The mean vacuum drop should not be higher than 2 kPa.
- Pulsation is also important in terms of welfare and prevents teat edema and discomfort during milking.



7. WELFARE OF SHEEP USED FOR SCIENTIFIC PURPOSES

The welfare matters for the sheep to be used for scientific researches are identified and main matters are as follows:

- Researchers and animal carers are responsible for the welfare of the sheep in scientific researches.
- The research team must have a good knowledge of the biology, behavior, husbandry conditions and feed-water needs of the sheep for the successful conduct of the research.
- The personnel should receive training and practice.
- Researchers must provide detailed protocols for the methods to be used.
- The use of the sheep must suit the identified purpose, appropriate sheep must be selected for such purpose and applications must be carried out in a way to minimize risks to welfare. Those who use sheep need to be aware of and minimize the potential sources of stress for their animals.
- Pain relief procedures must be applied in operations.
- The facilities to be used must comply with the nature and age of the sheep.
- The level of confinement must be appropriate for the scientific purposes.
- Animals must be transported in confinement facilities in appropriate vehicles and with methods appropriate for the class of sheep.
- The handlers of animals and the drivers of the vehicles used for transport must provide the standard welfare requirements during the transport of the sheep. Monitoring of animals is an essential task for both good animal welfare and good research. Therefore, inspection, hazard analyses and the method and management must be regularly recorded.

References

1. Anonymous, 2007. Code of accepted farming practice for the welfare of sheep (Victoria). Victorian Government Department of Primary Industries, Bureau of Animal Welfare, Revision Number 2, Victoria, Australia.
2. Mason, J., 2010. Welfare decisions for sheep. Primefacts, 1003, Industry&Investment, NSW.
3. Sevi, A., Casamassima, D., Pulina, G. And Pazzona, A., 2009. Factors of Welfare Reduction in Dairy Sheep and Goats. Italian Journal of Animal Science, 8(1): 81-101.
4. Anonymous, 1979. European Convention for the Protection of Animals for Slaughter. Council of Europe, Strasbourg.
5. Anonymous, 2004. On the Singing of The European Convention for the Protection of Animals During International Transport. Official Journal of The European Union, 2004/544/EC.
6. Anonymous, 2000. Concerning Minimum Requirements for the Inspection of Holdings on which Animals are Kept for Farming Purposes. Official Journal of The European Communities, 2000/50/EC.
7. Anonymous, 2005. Policy on the Care and Use of Sheep for Scientific Purposes Based on Good Practice. From a Workshop held on the 20-21 April, 2005, Monash University and Animal Welfare Science Centre, Monash University, Australia.
8. Anonymous, 1999. Code of Recommendations for the Welfare of Livestock: Sheep. Department for Environment Food and Rural Affairs (Defra), Scotland.
9. Altınçekiç, Ş.Ö. and Koyuncu, M., 2010. Effects of Transport Conditions on Animal Welfare. Hayvansal Üretim, 51 (1): 48-56
10. Anonymous, 2010. Annual Review 2009-2010. The Farm Animal Welfare Council, UK.
11. Anonymous, 2009. Sheep Health and Welfare Update. Spring 2009, Wool Producers, Australia.
12. Anonymous, 2010. Sheep and Goat Health and Welfare. Department for Environment Food and Rural Affairs, Scotland (Defra),
13. Anonymous, 2008. Animal Welfare Guidelines-Sheep. Department of Primary Industries and Water, Tasmania.