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Review Article

CARE AND MANAGEMENT OF DROUGHT ANIMALS: A REVIEW

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Introduction

Today in any agricultural production system, draught animals, humans, and engines provides the power for crop production transport, harvesting, and processing. India has a total of 70 million drought animals. In our country about 65% of land is ploughed by drought animals (Singh, 2013). Draught animal power is a reliable and popular source of energy in most developing countries. Cattle contribute highest about 70% of total drought animal power whereas contribution of other species Buffalo (29%), Camel (0.54%), Horse and Ponies (0.43%), Donkey (0.51%), Mule (0.10%) and Yak and Mithun (0.11%) is less (Singh, 2013). Today animal traction farmers faces many constraints like high draught, poor design of harnesses, forces rapid ploughshare wear, and many other implements. Also, livestock owner, government, research worker and many animal related societies placed no or little emphasis on the importance of draught animal care and management. Proper care and management is very essential for maintaining health status of drought animals. Mukharjee *et al.* (1961) reported about the effect of working hours on the physiological parameters in drought animals. In feeding minerals, vitamins, protein and energy sources are essential to maintain health of drought animals. Due to high energy demand drought animal may face different weakness related problems if feeding is not proper.

Feeding Management of draught animals

An drought animal should be in good health with sound in body. In a rapid appraisal survey 1995, animal disease was a major constraint to the use of draught animals for agriculture and allied sector (Starkey *et. al.,* 1995). The health and welfare of drought animals is essential to maximize their performance and production capacity (Starkey *et. al.,* 1995; Pearson *et. al.,*

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1997). For better performance animals need to be kept free from injury, disease and harmful parasites. Regular application of preventative and remedial vaccines and treatment should be undertaken. For perform well, draught animals should fed of a suitable quantity and quality. Sufficient quality and quantity of feed and water is essential not only for good physical condition, but to supply the energy and other requirements for their maximum potential. Nutrients comprises of mainly four classes; vitamins, minerals, proteins and energy which are essential for growth, pregnancy and lactation. Due to lake of knowledge about the maintenance requirements of draught oxen differ from those of cattle kept for other purposes, we generally provide some extra nutrients to drought animals needed for work.

Vitamins Mineral, Protein and Energy requirements of drought animals

There seem to be no significant extra requirements for vitamins and minerals in working animals over and above those contained in the extra food needed to supply the animal's increased energy needs. Indian climate is hot and humid. For the proper growth and metabolic activity drought animal should provide sufficient amount of mineral and vitamins. The requirement of minerals and vitamins may be different according to the availability of these nutrients in the soil, feed and fodder. So in very hot climates animals need extra salt for replacing lost in sweat. As in the case of vitamins and minerals, protein requirements are less in drought animals. Exercise seems to have little effect on urinary nitrogen excretion in man. Any decrease in nitrogen balance is not large enough to be of any nutritional importance. So very little requirement for extra protein during work. In the case of ,an underfed animal; the release of body reserves to meet the animal's need for energy will also involve the release of sufficient extra protein.

The most important requirement for draught animals is for energy. In ruminant animals the requirement of energy is for mainly following purposes: maintenance, growth, fattening, pregnancy, lactation and work. These are called as net energy requirements because in addition animals use them for any of the above processes. Drought animal power has to potential to generate 27,000 million kWh energy (Singh, 2013). A more flexible system is that based on the absorbed or metabolisable energy (ME) system (MAFF 1975). The ME value of a food is easier to calculate than the NE by simply subtracting energy losses in the form of faeces, methane and gas urine from the gross energy or heat of combustion of the food. The ME value of food tends to be fairly constant under most conditions. In a total food requirement by using the ME system estimates the total amount and type of work which needs to be done and then calculate the ME necessary to do the work. Then calculation total

food requirements for maintenance and work should be done. The oxen only used energy equivalent to 1 .67 x maintenance when working a 5.5-hour day. Draught animals generally need less energy than dairy cows of similar size and this difference becomes greater when oxen seldom work every day in a week and only 100-200 days a year.

So we need (a) Energy requirement for work, i.e. the NE and (b) the heat increment associated during work. Combining of these will tell us the extra ME required for work. We cannot calculate the energy used by a working animal in the field conditions directly. However, by different methods we can calculate these requirments. The information necessary to make these estimates can be summarised as:

Energy used for work = energy for walking + energy for carrying loads + energy for pulling loads + energy for walking uphill

This formula may be expressed quantitatively as:

E = A FM + B F L + W/C + 9.81 H M/ D

Where,

E = extra energy used for work (kj), F = distance travelled (km), M =live weight (kg), L = load carried (kg), W = work done whilst pulling loads (kJ), H = distance moved vertically upwards (km), A =energy used to move I kg of bodyweight 1 m horizontally (1), B = energy used to move I kg of applied load I m horizontally (1), C = efficiency of doing mechanical work (work done) / energy used, D = efficiency of raising body weight work done raising body weight / energy used.

Table 1: Energy and protein requirements for draught cattle (Goe and McDowell , 1980).

	TD(kg)	ME(MJ/day)	Digestible protein(g)
Maintenance requirement(Mm) (LW in kg)			
200	1.7 (25.6)	26.5	120
300	2.3 (34.6)	35.5	180
400	2.8 (42.2)	44.6	240
600	3.8 (57.2)	62.9	360
Growth			
Additional allowance for 300 kg animal gaining			
100 g/day	0.26 (3.92)		
300 g/day	0.87 (13.10)	4.71	17
		11.26	52

Work (Total requirement) Lightwork (sowing/transport)	1.5 x Mm requirement	1.5 x Mm requirement	
Medium-heavy (cultivation/harrowing)	2.0 x Mm requirement	2.0 x Mm requirement	
Heavy (ploughing/training)	2.5 x Mm requirement	2.5x Mm requirement	

Selection of Animals for drought purpose

A bullock and a cow produces 0.74 Horse power (HP) and 0.45 HP energy (Sastry and Thomas, 2012). Upadhyay and Madan (1985) suggested a score point of 40 for oxen and buffaloes. Selection animals for drought power are mainly done when the animals reach 3-4 years of age. Selection is based mainly on height at wither, size, as well as general body development. No any significant effect was observed due to absence of hump on the drought ability in the crossbred cattle (Acharya *et al.,* 1979). The other characteristics which is important for selection of working animals are: temperament and behavior, feet and walking, mouth, teeth and eating habits, neck and tail, hair whirls, skin thickness, hair colours and markings, big broad brisket, big long body, broad straight back and big hump (in cattle), horn size, shape, and setting. Mass selection techniques is recommended by the FAO Expert Consultation on Draught Animals (FAO 1982). They suggested that selection should be carried out in that environment where animals work. In mass selection manly performance of the animals is tested. We can also use family selection but the small family size of cattle may cause a problem. It is due to drought power of animals appears late in life, makes resulted in progeny tests very difficult.

In Indian condition only very few farmers trying to use the crossbred buffaloes for draught. In case of indigenous farmers and different organizations worked to produce larger and taller crossbred cattle by through AI and natural mating for work. Cross bred bullock put on the work in younger age at 2 to 3 years and local bullocks will be ready for work at 3 to 5 years of age (Sastry and Thomas, 2012). Farmers select draught animals mainly on conformation, size, height and other parameters such as horns, chevron, colour, positions of hair whirls, and markings, etc. Draught power is directly correlated with body size and height.

For Judging of animal for draught purpose scoring system is followed. In judging mainly anatomy of the animal is used for assessing the body condition. Mainly the back thigh

muscles (Semitendinosus and Biceps femoris*)* is measured. Scoring should be done during the morning before feed consumption as it may effects the result.

Score Description

1. Emaciated animal. No apparent subcutaneous fat.
2. Marked emaciation. The back bone, ribs, hooks, hips, pins and tail -head are sharply visible.
3. The lower back bone still has a sharp feel but less so than in score 2.
4. The ribs and back bone are less protruding than in scores 2 and 3.
5. The transverse processes are less obvious than scores2 to 4.
6. Ribs are still visible, back bone barely visible, little fat cover.
7. Animal is smooth and well rounded, back bone cannot be seen but easily felt, hooks not visible.

Managemental practices for drought animals

Breeding Improvement

In a breeding programme improvement is manly based on either for draught-and-beef or for draught-and-milk. But breeding improvement for draught ability might not yield maximum benefits to the farmers. So for improvement of drought power we should also consider for the milk and beef parameters. Crossbreeding in cattle, beef or dairy, is not common in Asian countries. In many places cross breeding was done for the swamp buffaloes with the riverine breeds such as the Murrah for draught, meat, and milk. Liu (1978) worked for crossbreeding between swamp buffalo and Murrah for milk and meat and draught power. Similarly in China and the Philippines cross breeding program launched for was swamp, Murrah, and NilIi-Ravi for draught, meat, and milk. Chantalakhana (l983) reported about the evaluation of performance of crossbred in village conditions. The crossbred male animals are not economically efficient as indigenous drought animals (Rajpurohit, 1979).

Improving design of equipment

Due to improper design drought animal power wasted sometimes as much as 50% and the animals have to work hard beyond their capacity. Harnessing animals for work and incorrect use of equipment is painful to the animals and related to welfare problem (O'Neil & Kemp, 1989; Wilson, 2003). This causes increased in heart rate and behaviour alterations such as vocalization (Watts & Stookey, 1999). So vocalization is a easy indicators of ananimal's welfare (Dawkins, 1998). Any negative welfare and pain lead to activation of the

hypothalamus-pituitary-adrenal (HPA) and this resulted in higher plasma adrenocorticotropic hormone (ACTH) and cortisol levels (Hay *et al.,* 2003).

Draught animal welfare

Welfare is directly associated with the 'wellbeing' of animals. The five freedom of animals are summarized as (Brambell, *et. al.,* 1965):

• Freedom from starvation or physical discomfort

• Freedom from thermal or physical discomfort

• Freedom from fear or distress

• Freedom from pain, injury or discomfort

• Freedom to express most normal, socially acceptable patterns of behavior.

In our Indian conditions drought animals are maintained in the poor quality pastures, straw and crop residues. During the non-working season animals are maintained on a low-maintenance diet. So animals become very and when put for work during working season they cannot carry a normal load. For drought animals we should provide sufficient feed. We should provide adequate health care and prompt provision of veterinary services. We should apply well suited and fitted equipment for working which can prevention of injury while working. Allow sufficient rest and prevention of overstraining. Modern equipments and surgical treatment should follow. For proper care all the laws related to drought animal care should be follow. Prevention of confinement in inadequate stalls and other similar conditions. Adoption of We should follow the humane methods for shoeing, dehorning, nose-roping, branding, etc. Development of public awareness and education programmes for animal welfare.

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