

## EVALUATION OF EUTHANASIA METHODS IN EQUINE

By

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### ABSTRACT

This study carried out on 358 equine (horses, donkeys and mules) from El-Qalyubia, Cairo and Giza governorates (area of study) at end of their life cycle with critical injuries and in need to euthanasia. Questionnaire on methods of euthanasia was done during study with vets in non-government organizations (NGOs) and research centers from April 2015 to March 2016. All of these establishments in area of study used four different methods for euthanasia; first method by the intravenous rout of barbiturate overdose (Method A) represents a proportion of (9.5%) of total euthanized equine. Second method by used sedative e.g. xylazine then thiopentone 5-11mg/kg and lastly potassium chlorid 1-2 mmol/kg (Method B) represents a proportion of (72.3%) of total euthanized equine. Third method occurred through secured equine and inhaled chloroform then bleeding was done by cutting of the common carotid artery until complete bleeding occurred (Method C) represents a proportion of (9.5%) of total euthanized equine. Fourth method were done by using sedative e.g. xylazine then complete injection with magnesium sulphate saturated solution (Method D) represents a proportion of (8.6%) of total euthanized equine. Further studies were done to determine the effect of each method (A, B, C, D) on behavior, health include body condition score (BCS) and welfare of euthanized equine.

### **Keywords:**

Euthanasia, equine (horses, donkeys and mules), BCS, welfare.

### INTRODUCTION

The term euthanasia is usually used to describe ending the life of an individual animal in a way that minimizes or eliminates pain and distress. The study was determining the methods of euthanasia that were used in working equine and identify whether these were acceptable or not. Generally, when animal suffering cannot be elevated by any other means euthanasia is

the only humane solution. The Institutional Animal Care and Use Committee (IACUC) of (AVMA, 2007) have approved certain methods for humanely killing animals that meet the definition of euthanasia. The right method may vary from species to species; working equine may otherwise suffer a prolonged and painful death by neglect, abuse or disease. Working equine (horses, donkeys and mules) are widely distributed throughout the world. They are the backbone of the developing world which plays an important role in rural communities providing power and transport at low cost and helping millions of people earn a living. There are 112 million working horses, donkeys and mules in the developing world (FAOSTAT, 2011). Euthanasia of animals is usually performed due to illness or injury, and such euthanasia was not the right cause of death (COD), though there another primary illness was found. This primary illness should always be investigated in all cases in which euthanasia was the immediate cause of death. Methods of euthanasia must be humane and not interfere with animal welfare. The criteria for evaluating methods of euthanasia are that: it must be painless and not induce fear or apprehension in the animal; it must be reliable; it must be rapid; it must be safe and simple to operate; it must be nonreversible; it should be inexpensive; it should as far as possible be aesthetic; it should be possible to observe the animals at all times; and it should be safe for predators/consumers should the carcass be consumed (AVMA, 2013).

## **MATERIAL AND METHODS**

### **Study Districts:**

The study carried in Qalyubia, Cairo, and Giza Governorates which are the large three Governorates in middle Egypt. In this area large numbers of equine are found and share in many daily activities. Many cases euthanized in this area because the presence of many non-government organizations (NGOs) of animal welfare and veterinary research centers. The area of study has about 99136 donkeys, 6460 horses, and 3032 mules (**General organization of veterinary service, 2015**).

### **Design of study and animals:**

The study carried out on 358 equine in the area of study with critical injuries and euthanized in the period (**April 2015 to March 2016**). A questionnaire carried out in the area of study, included Section one consists of total 7 questions, including questions on type of establishment, questions on the circumstances in which euthanasia was performed, questions on the training and experience of those carrying out euthanasia, questions on the use of restraint and number of animals euthanized. Sections two consist of 3 questions on the

methods used for euthanasia for equine. The lists of potential injectable agents, gaseous agents, and physical methods, potential routes of administration, and categories to indicate if pre-medication were used.

**Health and behavior before and during euthanasia:**

(Described by Pritchard *et al.*, 2005). Clinical examination was using direct observation of health and behavior parameters started with the body as evidence starting at the nose, and end at the tail. The clinical history consisted of the animal's health and husbandry. The questions about clinical history varied according to the problem for which the animal presented, but normally included eating (appetite, any difficulty eating), evidence of tetanus, discharge from eyes or nose, coughing, wheezing or tiredness, lameness or weakness, problems with skin, abnormal behavior (colic), eyes (discharge, conjunctiva, 3rd eyelid prolapsed, cornea, globe, etc.), nostrils (color, consistency and amount of discharge), mouth (incisors, cheek teeth, oral cavity, etc.), ectoparasites (flies, ticks, mites, lice, etc.). Injuries produced by physical agents (burns, electrocution, heat, cold, etc.). Body condition score (BCS) on a scale of 1-5 (1, very thin; 5, very fat) and more horses were in very thin condition (BCS). All animals introduced to euthanasia had a different degree of pain so we made clinical examination of pained animal. Behavioral changes of the animal occurred to reduce or avoid the recurrence of the pain experience. Facial expressions and body postures that are indicative of emotional status have been described for each animal and many questions were asked for owner about the behavior of animals. Although the animal cannot tell us about its pain experience, physiology and behavioral changes can be observed which help us to diagnose the pain is present. During euthanasia animal behaviors differ according to the method of euthanasia and the total time from onset of euthanasia until death was recorded.

**Methods of euthanasia in the area of study:**

First method; This method when properly administered pentobarbitone sodium by the intravenous route, barbiturate overdose depresses the central nervous system, causing deep anesthesia progressing to respiratory and cardiac arrest, used in the Egyptian Society for Protection and Welfare of Working Animals (ESPWWA), the Egyptian Equine Aid, the Rural Wellness Initiative (RWI), and a number of VET clinics in the area of study (Method A). Second method; This method when using these steps; first, used sedative e.g. xylazine then second step used thiopentone 5 - 11mg/kg and then third step used potassium chloride 1-2 mmol/kg, used in the Brooke hospital for animal( Method B). Third method; this method

occurred through 2 steps first the equine was well secured and then inhaled chloroform then bleeding was done by cutting of the common carotid artery until complete bleeding occurred, used in veterinary research centers in Qalyubia and Giza (Method C). Fourth method; this method occurred through 2 steps first used sedative e.g. xylazine the completing by magnesium sulphate saturated solution, used in equine stables in the area of study (Method D).

**Data analysis:**

All the collected raw data during the study were entered into Microsoft Excel data sheet (excel software version 2016) and then analyzed as a percentage (%).

**RESULTS**

**Percentage of euthanasia in working equine according to methods:**

- Method A represents a proportion of (9.5%) of total euthanized equine.
- Method A is the most acceptable method for animal welfare has advantage of rapid and effective, minimal pain and discomfort and well accepted by public
- Method B represents a proportion of (72.3%) of total euthanized equine.
- Method C represents a proportion of (9.5%) of total euthanized equine.
- Method D Represent a proportion of (8.6%) of total euthanized equine.

**Table (1):** Methods of euthanasia used in working equine in area of study.

Methods of euthanasia	Working equine	
	No.	Percentage
Method A	34	9.5%
Method B	259	72.3%
Method C	34	9.5%
Method D	31	8.6%
Total	358	100%

**Health and behavior before and during euthanasia:**

Signs appeared on equine came for euthanasia depend on the cause of which the owner brought this animal to the establishment. Normally animals subject to euthanasia showed signs of fear and pain indicated by facial expressions and body postures that have been seen for each animal according to the degree of pain. So the animal appeared to be dull, depressed, sluggish and don't response to surrounding environment as in old age cases and paraplegia cases. The animals appeared to be excited, stressed and refused approaching as in deformity

of hoof or joint cases, fractures, affections of hoof or joint, perforating wound and recurrent tumor. Animals showed aggression, violent response toward approaching in cases of rabies. Through signs and behavior in case of late stage of tetanus and rabies we identified the proper cause for euthanasia so we don't in need to necropsy examination. Behaviors during euthanasia was different according to method used as in method (A) death occurred within 30-50 seconds allowed for a quiet and controlled loss of consciousness. In method (B) death occurred within 2-5 minutes with some convulsions. In method (C) death occurred up to more than 5 minutes and more convulsions and tremors. In method (D) death occurred up to more than 5 minutes and more convulsions and tremors.

**Percentage of euthanasia in working equine according to body condition score (BCS):**

The percentages of euthanasia in working equine according to BCS were illustrated in (Table 5). The BCS of the 225 euthanized donkeys showed (18.2%) thin, (26.7%) fair, (27.1%) good, (19.6%) fat and (8.4%) very fat. The BCS of the 127 euthanized horses showed (36.2%) very thin, (16.6%) thin, (13.4%) fair, (12.6%) good, (10.2%) fat and (11%) very fat. The BCS of 6 euthanized mules showed (100%) good.

**Table (2):** The body condition score (BCS) of euthanized working equine.

BCS	Donkeys		Horses		Mules	
	No.	Percentage (%)	No.	Percentage (%)	No.	Percentage (%)
Very thin	0	0	46	36.2	0	0
Thin	41	18.2	21	16.6	0	0
Fair	60	26.7	17	13.4	0	0
Good	61	27.1	16	12.6	6	100
Fat	44	19.6	13	10.2	0	0
Very fat	19	8.4	14	11	0	0
Total	225		127		6	

The criteria described by Carrol and Huntington (1988) as cited by Pritchard *et al* (2005).

**DISCUSSION**

Euthanasia is a very difficult subject, and the main barrier to euthanasia is cultural and economic rather than religion that plays a part in the decision due to some people thought that euthanasia is forbidden (Haram). But by education through well-developed relationship with owners they accept euthanize the suffering equine. One of the major welfare problems of

working equine in rural communities is suffering from untreatable diseases or injuries such as, terminal illness, rabies, permanent bone breakage of limbs and other serious or chronic illness. Most of these equine stays with pain and suffering until they die of the problem which recorded by **Ayele et al. (2006)**. Concerning to the methods of euthanasia, method A represent a proportion of (9.5%) of total euthanized equine, in despite of low percentage of this method, it is the most rapid and reliable methods of performing euthanasia and this agree with **AVMA, (2007)** which cited that intravenous sodium pentobarbital is considered to be an acceptable method of euthanasia as it rapidly causes loss of consciousness, followed by cessation of respiration and heart activity. But this method had low percentage because the drug is not available and controlled substance. The high percentage in method (B) a proportion of (72.3%) of total euthanized equine which used by Brooke hospital as most owner sent hopeless cases to it so large numbers of euthanasia occurred in it. Advantage of this method is inexpensive, available, easily administered in anesthetized animal and carcass can be eaten. Disadvantage of this method is requires mixing, requires anesthesia and see agnail convulsions. This method is economic and agreed with **Jones, (1992) and Knottenbelt , (1995)** who cited that any method chosen must be fulfill the criteria; effect a quick reliable death without pain, cause rapid loss of consciousness, with minimum stress, be safe for human operators and the public, be non-reversible, be economic, be easy to handle, store and administer. Method C and D unacceptable methods have many disadvantages as death is not immediate, have agonal convulsion and not accepted by public. This appeared lake of knowledge about animal's welfare and agreed with **Svendson, (1997)** who recorded that equine have been subjected to various problems such as lack of awareness, cruelty and poverty. Behavior of the animal before euthanasia was different according to cause of euthanasia, and all of this behaviors indicating pain which may include restlessness, head-lowering, head-turning, kicking at abdomen, teeth grinding, flaring of nostril, sweating, rigid posture, reluctance to be handled, rolling, flight behaviors, and aggression. But behaviors during euthanasia was different according to method used as in method (A) death occurred within 30-50 seconds allowed for a quiet and controlled loss of consciousness as a result of over dose of anesthetic drug. In method (B) death occurred within 2-5 minutes with some convulsions as a result of large quantity of solution injected to animals. In method (C) and (D) death occurred up to more than 5 minutes and more convulsions and tremors observed as absent of anesthetic drug. This agreed with **Jones, (1992)** which cited that animals introduced

to euthanasia showing unwanted behaviors according to degree of frightened and pain. Concerning the BCS was considered one of the most predisposing factors of euthanasia in equine. The BCS of euthanized working equine showed significant variation among the three species, Very poor BCS (very thin) was found only within the horse group with percentage of 36.2%. Malnutrition, bad food ingredient, hard and danger works may be the main causes of euthanasia in very thin BCS in horses. Within the groups of donkeys and mules the high percentage of euthanasia was observed in fair and good BCS and this may be attributed to the overload and danger work that results in many dangers injures. On the other hand, **Burn *et al.*, (2010)** reported that, the thinner BCS animals were likely to have sever injures and large body lesions.

### **CONCLUSIONS**

The presented study helping to evaluate of different methods of euthanasia in Egypt and identify whether these were likely to be associated with any animal welfare concerns or not (choice the most humane method of euthanasia in equine) represent the first aid for deal with illegal method of the euthanasia, and we found that the second line for solving this problem was proper education of animal owner and operator of euthanasia.

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