

SOME MANAGERIAL FACTORS AFFECTING CORTISOL LEVEL AND MEAT QUALITY OF CAMELS

Al-Sadik Khalil Youssef Saleem

Dept. of Hygiene and Animal Husbandry
Faculty of Vet. Med. - Zagazig University, Egypt

ABSTRACT

Forty male camels were used in this study in Zagazig abattoir, Sharkia Province in a period from 1st of February till end of June 2004.

Animals were classified into four equal groups (10 of each). Animals of First group were used to study the influence of transportation method on cortisol level and meat quality of camels. Second group were used to study the influence of preslaughter transportation distance on cortisol level and meat quality of camels. 3rd group were used to study the influence of preslaughter transportation density on cortisol level and meat quality of camels and 4th group were used to study the influence of preslaughter handling on cortisol level and meat quality of camels. The result obtained showed that camels which were transported by walking to abattoir had a lower cortisol level than that transported by a vehicle. Also meat of walked camels were better than that transported by a vehicle.

Camels which were transported before slaughtering for short distance had lower cortisol level and better meat quality than that transported for long distance .

Camels which were transported individually had a lower cortisol level and better meat quality than that transported in group. Animals which were gently handled had a lower cortisol level and better meat quality than that roughly handled. In conclusion attention should be paid to camels during transportation, handling before slaughtering for obtaining good quality meat.

INTRODUCTION

The camel (*Camelus dromedarius*) has always played a major socio-economic role in pastoral societies of arid and semiarid zones of Africa and Asia. In fact, most of these societies have been camel-based ones where camel ownership is prestigious and a sign of wealth and power.

Camel not only survived for drought but continued reproducing and producing nourishment for millions of human beings.

Much concern for the welfare of farm animal during long distance transport as it involve long periods without water and food and extreme temperature. The length of Journey might compromise the welfare of the animal transportation include several aspects that can cause welfare problems. Injury during handling and motion, hunger and thirst due to water and food restriction, thermal and physical discomfort due to inadequate ventilation space and vehicle motion, fear and distress due to handling, confinement and exposure to novel stimulus and behaviour restriction due to confinement and vehicle motion (Villarroel et al., 2001).

An animal may be subjected to various stressors during transport to an abattoir, during holding and movement at the abattoir and during the slaughter process, animal welfare consideration dictate that every effort should be made to minimize these stressors, additionally there are sound economic reasons why stress prior to slaughter should be minimized as there is a wealth of evidence that stress is on factors contributing to meat quality problem such as dark cutting meat (Lensink et al., 2001) . transportation and handling before slaughter can adversely affect the carcass such as its pH, colour, texture (Gallo, et al., 2003).

this study examined the influence of some managerial factors affecting on cortisol level and meat quality of camels as follows:

- i- Influence of transportation method on cortisol level and meat quality of camels.
- ii- Influence of preslaughter transportation distance on cortisol level and meat quality of camels.
- iii- Influence of preslaughter transportation density on cortisol level and meat quality of camels.
- iv- Influence of preslaughter handling on cortisol level and meat quality of camels.

MATERIALS AND METHODS

This study was carried out in abattoir at Zagazig city from the period of 1st February to end of June 2004. Forty male camels were used in this study and classified into equal four groups (each group 10 camels).

- 1- **First group** : were used to study the influence of the transportation method on cortisol level and meat quality of camels, five of them were exposed for walking to abattoir while the remaining five camels were transported by cars.

- 2- **Second group** : camels in this group were used to study the influence of transportation distance on cortisol level and meat quality of camels, five of them were exposed to short transport distance (less than 2 km), while other five were exposed to long transport distance (over 50 km) .
- 3- **Third group**: were used to study influence of preslaughter transportation density on cortisol level and meat quality of camels, five of them were exposed to transportation within group (more than two animals in one vehicle) while the other five animals were exposed to individual transportation.
- 4- **Fourth group**: ten camels were used to study the influence of preslaughter handling on cortisol level and meat quality of camels, five of them were roughly handled at abattoir and didn't take a period of rest before slaughtering. While the other five were exposed to resting period about 30 min. and gently handled before slaughtering.

Collection of blood samples:

The blood samples were collected immediately after slaughtering before dressing in a vial containing heparin as anticoagulant, then the samples were centrifuged at 3000 r.p.m for 10 min. The obtained plasma were stored at -20°C till using as recommend by **Cockram and Corley (1991)**.

Estimation of plasma cortisol:

The levels of cortisol were detected in Central Laboratory at Faculty of Vet. Med., Zagazig Univ., using ELIZA technique (**Rcdbo, 1993**).

Collection of meat samples:

Meat samples (100 gm) were collected from slaughtered and eviscerated camel and all samples were collected and well identified in a sterile polyethylene bag and transferred as quickly as possible in an insulated ice box to lab. Where they examined for pH and bleeding. **Sanz et al. (1996)**.

Examination of meat for pH:

For measuring the pH of meat the pH meter was used according to **Pearson (1984)**.

Examination of meat for bleeding:

This carried out by chemical method (Reder's test) as recommended by **Gracey (1986)**.

The obtained results were statistically analysed according to **Snedecor and Cochran (1980)**.

RESULTS AND DISCUSSION

Concerning the influence of transportation method on mean level of cortisol and meat quality of camels as shown in Table (1). It is clear that camels which were walked to abattoir had a lower cortisol level (18.5 ± 2.51 ng/L) than which were transported by a car (25.6 ± 2.82 ng/ml).

Also transportation by a car increase the pH of meat (6.01 ± 0.02) while in walked camels it was (5.7 ± 0.01).

The percentage of well-bled meat was higher in camels which were walked before slaughtering to abattoir than which were transported by a car. It was believe that transportation consider as stress factor affecting meat quality of camel as suggested by many authors (**Nannicosta et al., 2003 and Villarroel et al., 2003**).

Table (2) shows that the influence of preslaughter transport distance on cortisol level and meat quality of camels. Camels which were transported in short distance had a lower cortisol level (25.1 ± 2.5 ng/ml) than that which were transport for a long distance (33.5 ± 3.5 ng/ml). The pH of meat was lower in carcass of camels which were transported for short distance (5.7 ± 0.01) than which were transported for long distance (6.1 ± 0.02).

It is clear that camels which were transported in a long distance had high level of cortisol which increases hepatic glycogenolysis and gluconeogenesis. Thus decrease the level of glycogen during rigor mortis with decrease level of lactic acid and increase the pH of meat. The obtained results are agree with the findings of **Lensink et al. (2001) and Gallo et la. (2003)**.

Also the percentage of well bled meat was higher in carcass of camels which were transported for short distance (80%) than other that were transported for long distance (40%).

This result may be due to that camels in long transportation distance were exhausted thus bleeding was weak.

Studying the influence of preslaughter transportation density on cortisol level and meat quality of camels as shown in Table (3).

The mean level of cortisol was (20.2 ± 2.55 ng/ml) in camels which were transported individually (plate 1) while it was (28.5 ± 3.12 ng/ml) in camels were transported in group either from the same species or other species (Plate 2).

Regarding to meat quality in relation to transportation density, the meat of camels which were transported individually was better than that which were transported in group as shown in pH and well bled meat in Table (3) and this may be due to high level of cortisol. These results are in agreement with reported by **Honkavaaram et al. (2003)**.

Table (4) shows that the influence of preslaughter handling on cortisol level, meat quality of camels.

The mean level of cortisol in gentle handling camels was (21.5 ± 2.1 ng/ml) while it was 35.5 ± 3.2 ng/ml in roughly handled camels.

This difference due to effect of rough handling on pituitary gland and secret more cortisol as recorded by **Grandin (1997)**.

The meat quality of camels which were gently handled was better than camels which were roughly handled.

The pH of meat of gently handled camels was lower (5.7 ± 0.01) than roughly handled camels (5.9 ± 0.02).

The elevation of pH in rough handling due to an increase in glycogenolysis by cortisol as suggested by **Warriss (1990)**.

The percentage of well bled meat was much higher in gentle handled camels (80%) than roughly handled camels (20%).

This may be due to exhaustion of camels due to rough handling. So the bleeding was weak.

In conclusion the suitable and comfort method of transportation should be used in camels. A gentle handling at abattoir is necessary for obtaining good quality meat. So improving management during transportation and slaughtering of camels is recommended.

Table (1): Influence of transportation method on cortisol level and meat quality of camels.

Variable	Walked camels	Camels were transported by a car
Cortisol (ng/ml)	18.5±2.51 ^b	25.6±2.82 ^a
pH	5.7±0.01	6.01±0.02
Bleeding percentage		
<i>Well bled</i>	60%	50%
<i>Moderate bled</i>	40%	50%
<i>Ill bled</i>	0.0%	0.0%

Means with different superscripts in each row are different at level ($P \leq 0.05$).

Table (2): Influence of preslaughter transportation distance on cortisol level and meat quality of camels.

Variable	Short transport distance	Long transport distance
Cortisol (ng/ml)	25.1±2.59 ^b	33.5±3.5 ^a
PH	5.7±0.01	6.1±0.02
Bleeding percentage		
<i>Well bled</i>	80 ^a	40 ^b
<i>Moderate bled</i>	20 ^b	60 ^a
<i>Ill bled</i>	0.0	0.0

Means with different superscripts in each row are different at level ($P \leq 0.05$).

Table (3): Influence of transportation density on cortisol level and meat quality of camels.

Variable	Individually transported camels	Group transported camels
Cortisol (ng/ml)	20.2±2.55 ^b	28.5±3.12 ^a
pH	5.8±0.01	5.99±0.01
Bleeding percentage		
<i>Well bled</i>	60 ^a	50 ^b
<i>Moderate bled</i>	40 ^b	50 ^a
<i>Ill bled</i>	0.0	0.0

Means with different superscripts in each row are different at level ($P \leq 0.05$).

Table (4): Influence of preslaughter handling on cortisol level and meat quality of camels.

Variable	Gentle handling	Rough handling
Cortisol (ng/ml)	21.5±2.1 ^b	35.5±3.20 ^a
PH	5.7±0.01	5.9±0.02
Bleeding percentage		
<i>Well bled</i>	80 ^a	20 ^b
<i>Moderate bled</i>	20 ^b	80 ^a
<i>Ill bled</i>	0.0	0.0

Means with different superscripts in each row are different at level ($P \leq 0.05$).

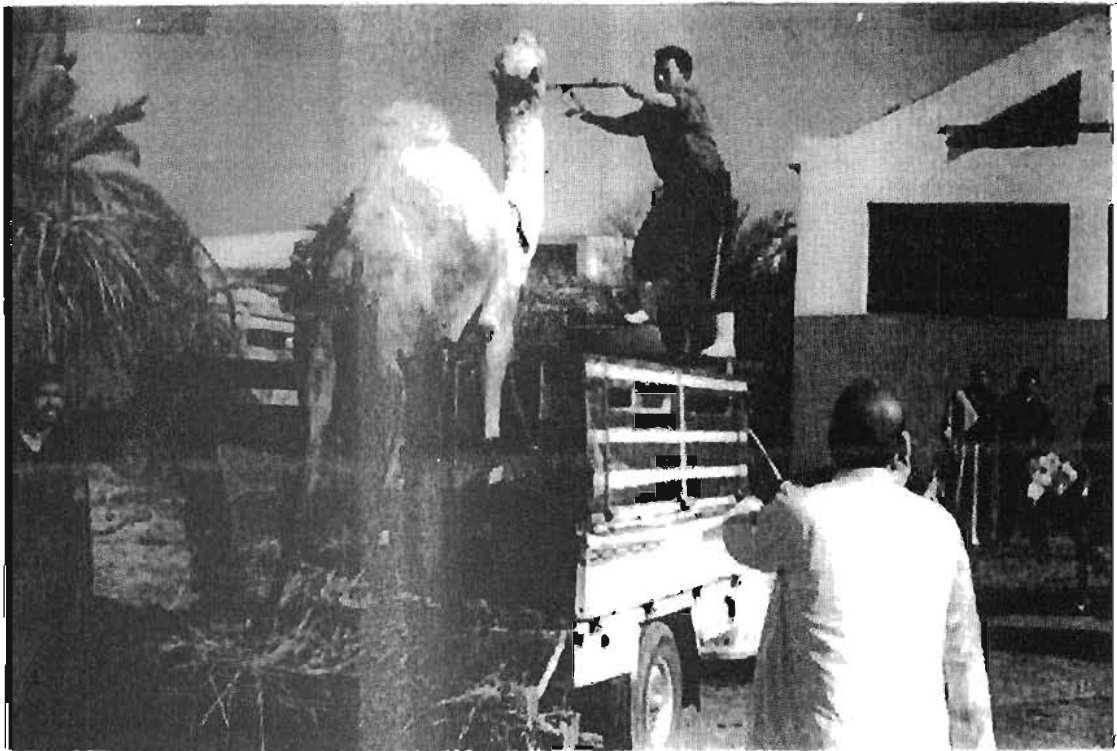


Plate (1): Camel was transported individually.



Plate (2): Camel was transported in group.

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Photo (1): Camel was transported individually.

الملخص العربي

تأثير بعض عوامل الرعاية على مستوى هرمون الكورتيزول وجودة اللحوم فى الجمال

المشركون فى البحث

الصادق خليل يوسف سليم

قسم الصحة ورعاية الحيوان - كلية الطب البيطرى - جامعة الزقازيق - مصر

تمت هذه الدراسة فى مجزر الزقازيق بمحافظة الشرقية فى الفترة من أول فبراير حتى نهاية يونيو ٢٠٠٤ وذلك لدراسة بعض عوامل الرعاية المؤثرة على مستوى هرمون الكورتيزول وجودة اللحوم فى الجمال، وقد تم إستخدام ٤٠ من ذكور الجمال وتم تقسيمهم إلى أربع مجموعات متساوية كل منها ١٠ جمال، المجموعة الأولى لدراسة تأثير طريقة النقل على مستوى هرمون الكورتيزول وجودة اللحوم والمجموعة الثانية لدراسة تأثير طول مسافة النقل على مستوى هرمون الكورتيزول وجودة اللحوم والمجموعة الثالثة لدراسة كثافة النقل على مستوى هرمون الكورتيزول وجودة اللحوم والمجموعة الرابعة لدراسة المعاملة قبل الذبح على مستوى هرمون الكورتيزول وجودة اللحوم وقد أظهرت الدراسة النتائج الآتية :

١- كان مستوى هرمون الكورتيزول فى الجمال التى تم نقلها عن طريق المشى إلى المجزر أقل من التى تم نقلها عن طريق النقل بالسيارة وكذلك كان معدل الأس الهيدروجينى أقل فى الحيوانات التى تم نقلها عن طريق المشى وكانت نسبة الإدماء أعلى فى هذه الحيوانات.

٢- الجمال التى تم نقلها لمسافة قصيرة قبل الذبح كان مستوى هرمون الكورتيزول وكذلك الأس الهيدروجينى ونسبة الإدماء أقل من الحيوانات التى تم نقلها لمسافة طويلة قبل الذبح وعلى العكس كان نسبة الإدماء أعلى.

٣- الجمال التى تم نقلها فى كثافة منخفضة (وحيداً) تم الحصول على لحوم منخفضة فى الأس الهيدروجينى وعالية فى نسبة الإدماء.

٤- لحوم الجمال التى تم معاملتها برفق قبل الذبح كانت أجود من لحوم الجمال التى تم معاملتها بقمرة قبل الذبح. ونستخلص من هذه الدراسة أن تحسين عوامل الرعاية أثناء نقل الحيوان وتقليل عوامل الإجهاد والمعاملة برفق قبل الذبح يساعد على تحسين جودة اللحوم.