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THE CAMELIDS, MAIN STAKES
FOR SUSTAINABLE DEVELOPMENT”

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IMPACT OF TRANSPORT DISTANCE ON STRESS BIOMARKERS LEVELS IN DROMEDARY CAMEL (CAMELUS DROMEDARIUS).

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Abstract
The welfare conditions of domestic animals during transport to the slaughterhouse are largely known able to influence the level of their stress, physiology and meat quality. Furthermore, the reaction of animals to stressors depends on the duration and intensity of these stressors. The objective of the study was to investigate the effect of transport distance on some blood physiological indicators of stress (haematocrit, haemolysis, cortisol, glucose and lactate) and biomarkers of oxidant stress (malondialdehyde and catalase) in camels. Transport distances were categorized as short (72-80km), medium (160-170km) and long (350-360km) distance. All parameters analyzed here increased gradually and significantly (P<0.05) with transport distance, and that over longer distances these responses were more significant (P<0.005) compared with short-distance. A positive correlation (P<0.001) was obtained between transport distance, and that over longer distances these responses were more significant (P<0.005) compared with short-distance. A positive correlation (P<0.001) was obtained between cortisol, glucose, lactate, malondialdehyde and catalase. As conclusion, road transport is very stressful in camel, and the effects of this stress on the relevant indicators rising much with distance. Future work should focus on the effect of transport distance on some quality indicators of camel meat.

Key words: camel, haemolysis, oxidant stress, road transport, stress responses.
Introduction

During environmental stress, marked changes in the levels of reactive oxygen species scavengers occurred in the serum of camels (Kataria et al., 2010). As a very stressful factor, road transport of camels to the slaughterhouse is able to induce hypercortisolaemia (Saeb et al., 2010; El Khasmi et al., 2013) and may lead to an increase of free radical generation (Nazifi et al., 2009). Furthermore, the reaction to transport stress may have an impact on the quality of slaughtered animal meat and depends on the duration and intensity of this stressor (Malena et al., 2006; DeSilva and Kalubowila, 2012). The objective of the study was to investigate the effect of transport distance on some circulating indicators of stress: haematocrit (Ht), haemolysis (H), cortisol (Cor), glucose (Glu) and lactate (Lac), and two biomarkers of oxidant stress: malondialdehyde (MDA) and catalase (Cat) in camels.

Materials and methods

Three groups of 6 male camels: group I, group II and group III (6 to 9 years of age) were transported respectively from Settat (72-80 km), Fqih Ben Saleh (160-170 Km) and Essaouira (350-360) to Casablanca Municipality slaughterhouse. At the end of road transport, blood samples were collected with and without EDTA. Ht was determined and erythrocytes suspensions were prepared and stored at 4°C for 24h until analysis of H (O’Dell et al., 1987). H was analyzed by measuring the absorbance of supernatant at 540 nm after incubation of erythrocytes in different phosphate buffered saline (pH 7.4) concentrations, ranging from 0.1% to 0.9%. Sera were collected then stored at -20°C until analysis. Glu and Lac were measured using commercially available kits. Cor was analyzed by radioimmunoassay method in CNESTEN, Morocco, by using DIAsource Kit. MDA was measured by a colorimetric method (Satho, 1978). The Cat activity was measured as the μmol decreased H2O2/min/mg protein (Aebi, 1974). The amount of total proteins was determined using Buret method. The data were analyzed by the Mann-Whitney U test for comparison between groups. The degree to which variables were related is measured with Pearson’s correlation. P values greater than 0.05 were considered insignificant.

Results and discussions

In the work reported here, stress indicators increased gradually and significantly (P<0.05) with transport distance, and that further over longer distances these responses were more significant (P<0.005) compared with short-distance (Table 1). In addition, a positive correlation (P<0.001) was obtained between Cor, Glu, Lac, MDA and Cat.

Table 1. Effects of road transport distance on some stress indicators in dromedary camels. (M ± ET, n= 6 camels/group, *P<0.05, **P<0.005 comparison between long-distance and short-distance). H50: Phosphate buffered saline concentration inducing haemolysis of 50% of erythrocytes.

<table>
<thead>
<tr>
<th>Stress indicators</th>
<th>Group I 72-80 Km</th>
<th>Group II 160-170 Km</th>
<th>Group III 350-360 Km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haematocrit (%)</td>
<td>39.17 ± 1.17</td>
<td>41.17 ± 1.47</td>
<td>43.17 ± 0.98*</td>
</tr>
<tr>
<td>H50 (mosm/L)</td>
<td>132.65 ± 3.99</td>
<td>135.98 ± 6.33</td>
<td>147.65 ± 3.99</td>
</tr>
<tr>
<td>Glucose (mmol/L)</td>
<td>5.07 ± 0.28</td>
<td>7.08 ± 0.21</td>
<td>9 ± 0.35</td>
</tr>
<tr>
<td>Lactate (mmol/L)</td>
<td>9.97 ± 0.31</td>
<td>12.99 ± 0.16</td>
<td>14.88 ± 0.29</td>
</tr>
<tr>
<td>Malondialdehyde (nmol/mL)</td>
<td>1.58 ± 0.38</td>
<td>3.88 ± 0.20*</td>
<td>6.44 ± 0.52**</td>
</tr>
<tr>
<td>Catalase (KU/L)</td>
<td>60.08 ± 3.18</td>
<td>79.13 ± 3.84*</td>
<td>93.95 ± 3.62**</td>
</tr>
</tbody>
</table>

In camel, transportation stress can induce an increase of Cor, Ht, Glu and H (El Khasmi et al., 2013). The increase in the Glu and Lac related to fuel homeostasis, be explained by hepatic glucose production and an increase in the rate of gluconeogenesis. This response was mediated by an activation of the hypothalamo-hypophyso-adrenal axis during transport stress which induced a release of Cor and catecholamines. In addition, this release may reduce the preslaughter amount of glycogen then affect the postmortem biochemical evolution in muscle. The increase in the serum levels of stress biomarkers associated with the increasing travel distance observed here, has been reported by other investigation in other domestic species (Malena et al., 2006; DeSilva and Kalubowila, 2012). An increase in free-radical generation as a result of stress may be responsible of the high levels of MDA and Cat observed here, resulting oxidative damage of the erythrocytes membrane (Nazifi et al., 2009). Oxidative alterations of camel erythrocytes may be attenuated by incubation with vitamins A and/or C (Chakir et al., 2013). As conclusion, since the effect of transport distance is very stressful in camel, the maximum care should be taken during this process. Future work should focus on the effect of transport time on some quality indicators of camel meat.

References

EFFECT OF ADDING GRANGAL ON COMPOSITIONAL QUALITY OF CAMEL MILK CHEESE DURING STORAGE

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Abstract
This study was based on using Grangal to improve fermentation of camel milk. The cheese was made using FAR-M as a coagulant for camel (control cheese) in addition a parallel cheese was made after addition of 1% Grangal (Grancal cheese). Both cheeses were processed using the same condition and they were compared for 3 weeks. Higher cheese yield (8.85% vs. 7.35%) and higher total solids, protein, fat and ash were found for Grangal cheese (60.48, 27.15, 2828 and 9.52 %) compared to control cheese (52.64, 23, 26 and 8.53%). All the compositional content revealed reduction for both cheeses during the storage. However the acidity of the cheese to which Grangal was added showed higher value during the first week of storage compared to the control cheese, while lower values where observed thereafter. The present result suggested the use of additives; especially those that used indigenously by camel herders as they long traditional and rich knowledge about their habitat; in order to improve and enhance camel milk cheese processing.

Key words: camel milk, cheese, Grangal, storage, constituents

Introduction
The processing of camel milk into cheese difficult and it produces a week soft curd (Ramet, 2001 and El Zubeir and Jabreel, 2008). Benkerroum et al., 2011) demonstrated that cheese making from camel milk can be made providing that the appropriate chymosin concentration was used in addition to starter culture (Hailu et al., 2014). They are also reported the possibility of making cheese from camel milk by coagulating it using ginger crude extract. Similarly Suliman and El Zubeir (2014) found that there were wide varieties of additives used for preparing Gariss; a traditional fermented milk; and that

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ORAL PRESENTATIONS Session 2 The production and products of Camelids


SAҚТАУ КЕЗІНДЕГІ ТҮҮЕ СҮТІНЕН ДАЙЫНДАЛҒАН ИРІМШІКТІҢ КОМПОЗИЦИЯЛЫҚ САПАСЫНА GRANGAL ҚОСУДЫҢ ƏСЕРІ

Бұл зерттеу түйе сүтін ашытуының жақшарту үшін Grangal пайдадануға негізделген болатын. Ирімшіктер, түйе сүтің коагулант ретінде FAR-M (бакылау ірімшік) және 1% Grangal (Grancal ірімшік) косу арқылы дайындалынатын. Еки ірімшік бірінші жағдайлда үндеді және олар 3 апта бойы салыстырылды. Ирімшіктің артықшылығы шығын (8,85% қарсы 7,35%) және жалпы қатты заты әртарат, ақуыз, май және күл жоғары, Grangal ірімшік үшін табылған (60,48, 27,15, 2828 және 9,52%) бақылау ірімшік пайдаданың (52,64, 23, 26 және 8,53%). Барлық композициялық мазмұны сақтау кезінде екі ірімшік темендеу әңкі болды. Теменке өңделген сұралуың қайықтап, алайдан Grangal косылғанда, оған ірімшік қышқы дайын, бакылау ірімшік косылғанда сақтаудың бірінші апталасы және жоғары мән керсetti. Қазірі нетіжесі көлөсі коспақұлұға қолдануды ұсындады: әлар тіріліп ету ертасы тұралы дәстүрлі және бай білимді ұзын қызмет бойы түйе сүті ірімшік үндеді және артықшы мақсатына үшін маңыздылығы әкеледен пайдаданылатын

Tuүін сөздер: түйе сүт, ірімшік, Grangal, сақтау, үшжақты

ЭФФЕКТ ДОБАВЛЕНИЯ ГРАНГАЛА НА КАЧЕСТВО СОСТАВА ВЕРБЛЮЖЬЕГО СЫРА ВО ВРЕМЯ ХРАНЕНИЯ

Это исследование было основано на использовании грангала для улучшения брожения верблюжьего молока. Сыры были изготовлены с использованием FAR-M в качестве коагулянта (контрольный сыр) и с добавлением 1% грангала (грангальный сыр). Оба сыра были обработаны в одинаковых условиях и они сравнивались в течение 3 недель. Больший выход сыра (8,85% против 7,35%) и большее количество твердых веществ, белков, жиров и золы были обнаружены в грангальном сыре (60,48, 27,15, 2828 и 9,52%) по сравнению с контрольным сыром (52,64, 23, 26 и 8,53%), Все составные обеих сыров показали снижение при хранении. Однако кислотность сыра, к которому был добавлен Грангал показала более высокие значения в течение первой недели хранения, но более низкие значения после. Настоящий результат предлагает использование добавок; особенно тех, которые традиционно использовались верблюдоводами. Эти добавки являются традиционными и улучшают обработку сыр из верблюжьего молока.

Ключевые слова: верблюжье молоко, сыр, Грангал, хранение, составляющие