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## **EXAMINATION OF HIDE PRODUCTION, HIDE GRADES, AND ECONOMIC LOSSES OF INFERIOR HIDE GRADES IN EGYPT DURING 2002 TO 2013**

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### **Abstract**

The study examined hide production and economic losses of inferior hide grades in Egypt during 2002 to 2013. Data were obtained from the Central Agency for Public Mobilization and Statistics for various livestock, and analyzed using descriptive statistics and one-way or two-way analysis of variance (ANOVA). The majority of hides produced were from buffaloes and were Grade 1 hides. Overall, the losses from condemned hides decreased from EGP1,756 in 2002 to EGP425 in 2013 (a decrease of 76%). Losses from Grade 3 hides also decreased from EGP141,369 in 2002 to EGP 63,859 in 2013 (a decrease of 55%). A concerted effort should be made to increase production from buffaloes to generate more revenues. Although the losses from both condemned and Grade 3 hides have been declining, we recommended the establishment of a buffalo hide quality grading system, and the development of an Extension education program to avoid activities that lead to losses.

**Keywords:** Hide Production, Hide Grades, Economic Losses, Inferior Hides

### **Introduction**

Livestock are reared for meat, milk, hides and/or wool production. The total livestock population in Egypt reached 18,400 thousand heads in 2014 (Central Agency for Public Mobilization and Statistics [CAPMAS], 2016). Small-scale producers dominate the livestock industry in Egypt and generally do self-slaughter and flaying of their animals. Indeed, many of them are unskilled and not fully aware of the hides' economic value. In fact, similar situations apply in other developing countries such as Ethiopia (Jemberu, 2017).

Hides and skins in Egypt are by-products of slaughtered animals. Thus, leather production is mostly based only on heavy and light leathers from cattle-, sheep-, and goat-skins (Nasr, 2011). Camel hides can contribute significant incomes to farmers, but in Egypt, the hides are not processed further into other products, due to specific constraints; such as, slaughtering in deserts away from slaughterhouses, which make it hard for collecting hides; high transportation costs for shipping hides from desert to tanneries, and a lack of interest by farmers. Many quality issues occur in camel hides, including marks from parasites or diseases, or defects attributed to poor curing or flaying which result in low quality of finished leathers (Ibrahim, 2013).

Currently, in Egypt, the leather production process comprises collecting the skins or hides from slaughterhouses, preserving them with salt and then transporting them to the tanneries. Most tanneries are located in Cairo or Alexandria, and they rely mainly on the chrome tanning method (Nasr, 2011); because it renders unique characters to leather in addition to its simplicity in operation (Chowdhury et al., 2015).

The absence of damaged grain layer of the skin indicates high-quality skin (Hadly, 2001). Top quality leathers are produced from hides or skins having few or no visible defects. Minor

scratches and irregularities are accepted. Inferior quality hides constituted up to 60% of produced hides in some developing countries, such as Sudan (Jabbar et al., 2002). Low values of hides might be attributed to parasitic diseases, such as hydatidosis, where the value of hides can be reduced by as much as 20% (Romazanov, 1983). Leach and Wilson (2009) stated that although any hide or skin can be used for leather manufacturing, the vast majority of hides are obtained from domesticated cattle, sheep, and goats. They added that the output of hides from developing countries is expected to increase to substitute for the slow supply from developed countries.

With the current constraints facing the livestock industry in Egypt, including high feed cost, lack of selection programs, and disease outbreaks, it is expected that livestock rearing and slaughtering will decrease in the next several years. This decrease could negatively impact the tanning industry. Based on the economic potential of the tanning industry, the Egyptian government established a new economic zone called “Al Robeky.” This zone aims to reduce operating and transportation costs. It also provides the necessary utilities to export value-added leather products rather than raw hides (Ministry of Trade and Industries [MTI], 2015).

Despite the promising future of the tanning industry, inferior grades of hides represent major economic losses to the industry. Amany (2008) reported that Egyptian exports from raw hides are continuously increasing. Moreover, imports from manufactured leather are increasing as well. This finding indicates there is an opportunity for value-added leather exports rather than exporting raw-hides. The quality of hides could be improved to reduce economic losses. Thus, the purpose of this research was to estimate economic losses attributed to inferior grade hides. The specific objectives were to (1) identify the overall number of hide units produced from different livestock, (2) determine the different grades of hides among and within different livestock, and (3) ascertain the economic losses caused by condemned hides and inferior grade hides.

### **Literature Review**

According to the United Nations Industrial Development Organization [UNIDO] (1991), hides are classified into first, second, third, and fourth grades according to the degree of defects and the area of the skin covered. When major defects cover most of the skin area, then such hides are considered rejects. Abadi (2000) stressed that poor quality hides affects the price of the end product and may also lead to rejects resulting in severe economic losses. The significant obstacles facing improvement of the leather sector are poor animal husbandry, lack of skills and technology, and poor handling of hides and skin.

Hide defects occur as a result of a variety of causes in the life of the animal, during slaughter, or post-slaughter (Kidanu, 2001; Ethiopia Sheep and Goat Productivity Improvement Program [ESGPIP], 2009). African hides have a negative image in the world market because of various reasons, including improper livestock management, malpractices during slaughtering, or post-slaughtering handling and processing, which result in very low share in the world market compared to its livestock population. Further, Amany (2008) explained that, for example, the low share of Egyptian manufactured leather products in international markets might be because traders export more raw hides than manufactured hides.

Leach and Wilson (2009) reported that many stakeholders in developing countries realized the existence of a number of problems in the leather sector, including poor infrastructure, weak power supply, lower labor productivity, obsolete technology, poor management, and poor quality of hides. Koloka and Moreki (2010), for instance, found that flay cuts and incisions are more common when slaughterhouses depend on hand flaying. According to (Adu-Asabere, 2011) tanners usually look for hides that are fresh and characterized by no fat or blood stains, with no excessive cuts or holes in them. United States Agency for International Development [USAID] (2013) stated that extensive damage of hides in the form of cuts and holes exist when hides are recovered by hand.

Ashenafi et al. (2013) found price variations for both raw and tanned hides. They suggested that tanners should adopt customized criteria of sorting raw hides due to post-mortem defects, which resulted in different grades. Ebrahiem et al. (2015) found that the most common defects contributing to downgrading of hides were flaying defects while the least were skin diseases defects. These defects further affect final products quality and economic returns.

Habib et al. (2015) added that antemortem hide defects disappeared during tanning processes, while some post-mortem defects caused by flay cuts constituted the major problems. They thought that the quality of the final product could be improved if the post-mortem defects were removed. In Egypt, most tanners are not ready to provide products for the international market, because of the size of the facilities and old machinery. These factors result in lower productivity per worker when compared to Europe. However, there is the potential for raw hides to be processed further into leather for export in order to achieve a higher profit margin for farmers (UNIDO, 2017).

## **Methodology**

### **Data Sources and Collection**

The data used in this research were obtained from the Central Agency for Public Mobilization and Statistics (CAPMAS) for the period 2002-2013. Data were collected on the different livestock species (buffaloes, calves, and camels). Among the data collected were the total number of hide units, number of hide units of different grades, the number of condemned units, and prices of condemned and Grade 3 hides. These parameters were collected on an annual basis for the study period.

### **Data Analysis**

Before the statistical analysis, adjustments were made to the data. For example, direct economic losses were estimated. Adopting procedures from Ngugi et al. (2016), economic losses from Grade 3 or condemned hides were determined by multiplying the number of hide units for each species by the unit price of Grade 1 hides in Egyptian Pounds (EGP). One-way Analysis of Variance (ANOVA) procedures were used to evaluate the main effects of livestock and hide grades. Further, a two-way ANOVA, with interactions, was used to analyze all possible paired combinations of the studied factors, including livestock species, hides grades, and years. Means separation and pairwise comparisons were done by Duncan's Multiple Range test, to ascertain if there were significant differences between means for buffaloes, calves, and, camels. All statistical analyses were conducted using SPSS for Windows (version 20, 2006).

## Results and Discussion

Table 1 shows the differences in production units of various hides among Egyptian livestock producers. It reveals that there were significant differences ( $P < 0.01$ ) in production. Most hides produced were from buffaloes (106,150 units), followed by hides of calves (49,847 units), and hides of camels (24,520 units). These results may be attributed to the good quality of buffalo hides. Buffalo hides are of good quality, and most tanning factories prefer them to other hides. The results agree with those of Amany (2008) who reported that the number of hide units and quality produced vary according to livestock, season, and hide imports.

Table 1. Overall Analysis of Number of Hide Units

Livestock	Numbers (Mean $\pm$ SE)
Buffaloes	106150 <sup>A</sup> $\pm$ 25262
Calves	49847 <sup>B</sup> $\pm$ 12526
Camels	24520 <sup>B</sup> $\pm$ 5088
P value	0.002

Means with different superscripts are statistically significant ( $P < 0.01$ )

Table 2 presents the number of hide units for grades within livestock. It shows that the hide grades differ significantly ( $P < 0.01$ ) among the livestock sources. That is, not only were the grades significant for a particular livestock source of hide, but were also significant among grades and between livestock source (interaction effect). The total number of Grade 1 hides were 220,438 units, followed by Grade 2 (17,938 units), and Grade 3 (2,304 units). The number of condemned hides was 10 units. The production of Grade 1 hides were, respectively, 401,277 units for buffaloes, 178,825 units for calves, and 81,212 units for camels. Also, the number of Grade 2 hides were, respectively, 22,857 units for buffaloes, 15,066 units for calves, and 15,890 units for camels. This trend was expected in accordance with (UNIDO, 2017), which reported that the majority of raw hides are of good quality (Grade 1 and Grade 2).

The number of Grade 3 hides were, respectively, 440 units for buffaloes, 5,498 units for calves, and 975 units for camels. The number of condemned hides were, respectively, 26 units for buffaloes, 0.5 units for calves, and 4 units for camels. The results can be attributed to the fact that skin of buffaloes is thicker than that of cattle and camels; therefore, buffaloes resist the external parasites more than the other two types of livestock. The overall result was that the hides of buffaloes were a higher grade level than the other livestock.

Table 2. Analysis of Number of Hide Units for Grades within Livestock (Mean  $\pm$  SE)

Grade	Livestock			Total
	Buffaloes	Calves	Camel	
<b>Grade 1</b>	401277 <sup>a</sup> $\pm$ 17730	178825 <sup>b</sup> $\pm$ 25444	81212 <sup>c</sup> $\pm$ 6091	220438 <sup>A</sup> $\pm$ 24843
<b>Grade 2</b>	22857 <sup>d</sup> $\pm$ 2046	15066 <sup>e</sup> $\pm$ 2595	15890 <sup>e</sup> $\pm$ 1163	17938 <sup>B</sup> $\pm$ 1278
<b>Grade 3</b>	440 <sup>g</sup> $\pm$ 89.20	5498 <sup>f</sup> $\pm$ 828	975 <sup>g</sup> $\pm$ 115	2304 <sup>C</sup> $\pm$ 470
<b>Condemned</b>	26 <sup>g</sup> $\pm$ 4.56	0.50 <sup>g</sup> $\pm$ 0.23	4.0 <sup>g</sup> $\pm$ 1.60	10 <sup>D</sup> $\pm$ 2.48
<b>Total</b>	141525 <sup>A</sup> $\pm$ 189702	66463 <sup>B</sup> $\pm$ 94754	32692 <sup>C</sup> $\pm$ 37335	

Livestock:  $p < 0.001$  \*\*

Grade:  $p < 0.001$  \*\*

Grade within livestock (interaction effect):  $p < 0.001^{**}$

Means with different superscripts are statistically significant ( $P < 0.01$ )

Table 3 shows the losses of condemned hides per year. The losses of condemned hides for buffaloes decreased from EGP 4,126 in 2002 to EGP 3,655 in 2003, then increased from EGP 4,464 in 2004 to EGP 8,363 in 2006; fell to EGP 3,680 in 2007; increased to EGP 6,765 in 2008; fell EGP 4,455 in 2009 and then fell steadily thereafter to EGP 1,275 in 2013. The losses of condemned calve hides increased from EGP112 in 2002 to EGP128 in 2003, and decreased to EGP68 in 2005, and was EGP158 in 2011, its highest level. The condemned camel hides decreased from EGP1,030 in 2002 to EGP150 in 2005 and increased to EGP700 in 2010, then decreased to EGP45 in 2011. The means of the losses are significant ( $P < 0.01$ ) for the various livestock types. Overall, the total losses of condemned hides decreased gradually from EGP1,756 in 2002 to EGP425 in 2013. These results support (Ashenafi et al., 2013) who reported that there were price variations for both raw and tanned hides and such variations were attributed to quality.

Table 3. Losses due to Condemned Hides (Means  $\pm$  SE) in EGP

Year	Livestock			Total
	Buffaloes	Calves	Camel	
2002	4126.59	111.50	1030.00	1756.00 <sup>a</sup> $\pm$ 1214.00
2003	3655.45	0.00	727.40	1460.00 <sup>a</sup> $\pm$ 1116.00
2004	4464.00	128.00	548.00	1713.00 <sup>a</sup> $\pm$ 1380.00
2005	5852.00	68.25	150.00	2023.00 <sup>a</sup> $\pm$ 1913.00
2006	8362.98	0.00	0.00	2787.00 <sup>a</sup> $\pm$ 2787.00
2007	3680.00	0.00	0.00	1226.00 <sup>a</sup> $\pm$ 1226.00
2008	6765.00	0.00	0.00	2255.00 <sup>a</sup> $\pm$ 2254.00
2009	4455.00	0.00	0.00	1485.00 <sup>a</sup> $\pm$ 1484.00
2010	1837.50	0.00	700.00	845.00 <sup>a</sup> $\pm$ 535.00
2011	1590.00	157.50	45.00	597.00 <sup>a</sup> $\pm$ 497.00
2012	1990.00	0.00	0.00	663.00 <sup>a</sup> $\pm$ 662.00
2013	1275.00	0.00	0.00	425.00 <sup>a</sup> $\pm$ 424.00
<b>Total</b>	4004.00 <sup>a</sup> $\pm$ 631.00	38.00 <sup>c</sup> $\pm$ 17.45	266.00 <sup>b</sup> $\pm$ 108.41	

Means with different superscripts are statistically significant ( $P < 0.01$ )

Table 4 reveals the losses due to Grade 3 hides. The amount decreased from EGP70,258 in 2002 to EGP2,125 in 2013 for buffaloes; it decreased from EGP303,893 in 2002 to EGP137,085 in 2013 for calves; it increased from EGP49,959 in 2002 to EGP52,369 in 2013 for camels. The total mean economic losses due to Grade 3 hides were EGP64,422 for buffaloes; EGP409,210 for calves, and EGP66,230 for camels. The means of losses are significant ( $P < 0.01$ ) for the various livestock types. Over the period, the total losses of Grade 3 hides decreased from EGP141,369 in 2002 to EGP63,859 in 2013. The overall decreasing levels of losses of Grade 3 hides, can be attributed to the improvement of processing technologies in tanning industries.

Table 4. Losses due to Grade 3 (Means  $\pm$  SE) in EGP

Year	Livestock			Total
	Buffaloes	Calves	Camel	
2002	70257.84	303893.25	49958.88	141369.00 <sup>a</sup> $\pm$ 81472.00
2003	93024.90	488740.50	65997.74	215921.00 <sup>a</sup> $\pm$ 136632.00
2004	106438.50	616000.00	78569.50	267002.00 <sup>a</sup> $\pm$ 174683.00
2005	108878.00	498498.00	133950.00	247108.00 <sup>a</sup> $\pm$ 125902.00
2006	87501.55	523821.50	23700.00	211674.00 <sup>a</sup> $\pm$ 157156.00
2007	98080.00	528452.50	74325.00	233619.00 <sup>a</sup> $\pm$ 147575.00
2008	74580.00	593975.20	114225.00	260926.00 <sup>a</sup> $\pm$ 166916.00
2009	104940.00	360105.36	47100.00	170715.00 <sup>a</sup> $\pm$ 96155.00
2010	20763.75	198340.35	57470.00	92191.00 <sup>a</sup> $\pm$ 54121.00
2011	4240.00	352327.50	35145.00	130570.00 <sup>a</sup> $\pm$ 111236.00
2012	2238.75	309292.50	61961.25	124497.00 <sup>a</sup> $\pm$ 93992.00
2013	2125.00	137085.00	52368.75	63859.00 <sup>a</sup> $\pm$ 39380.00
Total	64422.00 <sup>b</sup> $\pm$ 12696.00	409210.00 <sup>a</sup> $\pm$ 44703.00	66230.00 <sup>b</sup> $\pm$ 9045.00	

Means with different superscripts are statistically significant ( $P < 0.01$ )

### Conclusion

The study examined economic losses of inferior hide grades in Egypt from 2002 to 2013. Mainly, it identify the overall number of hide units produced from different livestock; determined the different grades of hides among and within different livestock, and ascertained the economic losses caused by condemned hides and inferior grade hides. Data were obtained from the Central Agency for Public Mobilization and Statistics (CAPMAS) for various livestock. The data were analyzed by using descriptive statistics, one-way analysis of variance (ANOVA), and two-way ANOVA. The results showed that the majority of hides were produced were from buffaloes (106,150 units), followed by calves (49,847 units), and camels (24,520 units). The total number of Grade 1 hides were 220,438 units, followed by Grade 2 hides (17,938), and Grade 3 hides (2,304). Buffaloes had the highest number of Grade 1 hides.

Also, the losses from condemned hides decreased for all three livestock from 2002 to 2013. The means of these losses were significant. Overall, the losses from condemned hides decreased from EGP1,756 in 2002 to EGP425 in 2013 (a decrease of 76%). However, for Grade 3 hides, the losses decreased from 2002 to 2013 for buffaloes and calves but increased for camels. The means of these losses were significant. Yet, over the period, losses from Grade 3 hides also decreased from EGP141,369 in 2002 to EGP 63,859 in 2013 (a decrease of 55%).

Since buffaloes provide the most hides and also the most Grade1 hides, a concerted effort should be made to increase production from buffaloes to generate more revenues. This does not mean that calves and camels should be abandoned, but instead, they should be the focus of the medium- to long-term, while the short-term focus should be on buffaloes. Additionally, although the losses from both condemned and Grade 3 hides have been declining, it is still recommended that a hide quality grading system be established; awareness about quality costs be promoted, and Extension education programs be developed to avoid animal skin diseases that lead to losses.

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