# FACTORS AFFECTING SOMATIC CELL COUNTS AND THEIR RELATIONS WITH MILK YIELD IN EGYPTIAN BUFFALO

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## SUMMARY

*A total of 3189 records for each of daily milk yield (DMY) and $log_{10}$ SCC (LSCC) in the first three parities for 364 Egyptian buffaloes raised at four experimental farms belonging to the Animal Production Research Institute, Egypt was used in this study. Data were collected at monthly intervals over the period from October 1999 to June 2004 to study non-genetic factors affecting DMY and LSCC, their trend along with the trajectory of DIM from 5 to 300d and their phenotypic relationship in the first three parities.*

*The fixed model included herd-test date (HTD) effect, days in milk (DIM) (10 classes starting with 1 for DIM between 5 and 30d and increased by 1 every 30 days along the trajectory up to 300d). Age at calving within each parity was analyzed as a covariate. Another trail was made using herd-year-season (HYS) effect instead of HTD. The results indicated that HTD had a highly significant effect ($P<0.001$) on both DMY and LSCC in all parities. Moreover, using HTD effect increased the accuracy of the model when compared with HYS effect. DIM had a highly significant effect ($P<0.001$) on DMY while it resulted a non-significant for LSCC in the first three parities. Age at calving had a significant effect on both DMY and LSCC in the second and third parities, while it had a non-significant effect on both traits in the first one. First parity had a different trend for both DMY and LSCC when compared to the second and third parities, which had similar trend. Curves for LSCC along the trajectory of DIM in the first three parities of Egyptian Buffalo shaped like an inverted milk production curves.*

***Keywords: Somatic Cell Count, Milk Yield, Egyptian buffalo***

***Abbreviation key:*** *DMY = daily milk yield, LSCC = $log_{10}$ Somatic cell count, DIM = days in milk, HTD = herd–test date.*

## INTRODUCTION

In Egypt, buffaloes are considered the main dairy animals. They contribute about 60% of the national milk production. Mastitis is one of the most common and costly diseases in dairy farms worldwide; approximately 70-80% of losses suffered are due to sub clinical mastitis (Reneau and Packard, 1991). Moreover to milk losses, the disease results in changes in levels of specific milk components and therefore the overall milk quality is reduced (Eberhart *et al.,* 1987; Kitchen, 1981; Harmon, 1994 and Cerón-Muñoz *et al.,* 2002). Hence, reducing mastitis incidence is important for economical, environmental and welfare reasons.

Somatic cell count in milk has been accepted as the international standard for mastitis diagnosis by the International Dairy Federation (IDF Standard 148A, 1995). It has a high genetic correlation with mastitis, higher heritability than for mastitis, and relatively easy to be recorded compared to direct recording of mastitis. Therefore, SCC has been included in the national breeding programs of several countries since more than 10 years (International Bull Evaluation Service, 1996). In Egypt, where there is lack of national database on disease resistance, such as mastitis, SCC becomes very important as a tool for reducing mastitis incidence.

The objectives of this study were to study non-genetic factors affecting daily milk yield (DMY) and $\log_{10}$ SCC (LSCC), investigate their trend along the trajectory of days in milk (DIM) from 5 to 300d and their phenotypic relationship in the first three parities of Egyptian buffalo.

## MATERIALS AND METHODS

### *Animals and Management:*

Data used in this study were collected at monthly intervals over the period from October, 1999 through June, 2004 from four experimental research herds belonging to the Animal Production Research Institute (APRI), Ministry of Agriculture and Land Reclamation, Egypt. Buffaloes were kept under semi-open sheds. Animals grazed Berseem (*Trifolium alexandrium*), when available, in addition to rice straw and different amounts of intergraded concentrate feed mixtures. The ration was offered twice daily and clean water was available all time. Buffaloes were hand-milked twice a day at 7 a.m. and 4 p.m. throughout the lactation period in Gemiza and Mahalet Mossa farms while machine milking was practiced in Nattaf Gedeed and Nattaf Kadeem farms.

### *Data:*

A total of 3189 test day records of milk yield and SCC (thousands/ml) of buffaloes in the first three parities were collected. There were 139, 198 and 174 buffalo cows with 878, 1242 and 1069 test day record for the first three parities, respectively.

Data included TD records between the $5^{th}$ and $300^{th}$ DIM. Buffaloes with less than 4 TD records /lactation were excluded from the data to insure better fitting of the lactation curve. Information after the $10^{th}$ TD records was discarded from data file. After editing, the percentage of 82% of TDR's were kept in the file. Ten DIM classes were defined. The first class included test days between 5 and 30 DIM and all the subsequent tests were of 30d interval up to 300 DIM. Table 1 presents average DIM (SD) for each DIM class for the first three parities. Age at calving ranged from 25 to 62mo for $1^{st}$ parity; from 39 to 99mo for $2^{nd}$ parity and from 49 to 125mo for $3^{rd}$ one. Average age at calving (SD) recorded 37.1 (6.3), 53.9 (9.2) and 68.0 (9.2) for the first three parities, respectively.

**Table 1. Average DIM (SD) for each DIM class for the first three parities**

| DIM class | 1st parity | | 2nd parity | | 3rd parity | |
|---|---|---|---|---|---|---|
| | $\overline{X}$ | SD | $\overline{X}$ | SD | $\overline{X}$ | SD |
| 1 | 18.6 | 7.0 | 18.2 | 7.8 | 17.9 | 7.9 |
| 2 | 45.5 | 8.4 | 45.8 | 8.5 | 46.3 | 8.6 |
| 3 | 75.5 | 8.4 | 75.5 | 8.5 | 74.7 | 8.2 |
| 4 | 106.0 | 9.0 | 106.5 | 8.8 | 105.2 | 8.7 |
| 5 | 135.7 | 8.5 | 136.2 | 8.5 | 134.8 | 8.1 |
| 6 | 164.8 | 8.3 | 165.5 | 9.0 | 163.6 | 8.2 |
| 7 | 195.0 | 8.8 | 195.9 | 8.5 | 193.1 | 9.0 |
| 8 | 225.1 | 8.4 | 225.8 | 8.4 | 223.1 | 8.9 |
| 9 | 245.2 | 8.6 | 252.9 | 8.9 | 251.0 | 7.6 |
| 10 | 283.5 | 8.5 | 280.8 | 9.3 | 277.3 | 6.1 |

DIM: days in milk

Individual SCC records for each test day were transformed to $\log_{10}$ SCC to meet the characteristics needed by hypothesis testing (Ali and Shook, 1980). SCC was measured alternatively following a monthly a.m.-p.m. recording scheme by automated method of infrared absorption spectrophotometry (Milk-o-Scan; Foss Electric, Hillerϕd, Denmark) at the Dairy Services Unit, which belonging to the Animal Production Research Institute, Sakha, Kafr El-Sheikh Governorate.

***Statistical Model:***

Fixed effects were analyzed applying the general linear model (GLM) procedure of SAS (SAS, 1996). The following statistical model was applied separately for each of the first three parities:

$$Y_{ijk} = \mu + HTD_i + DIM_j + b(A) + e_{ijk}$$

where:

$Y_{ijk}$ is the $k^{th}$ record of DMY or LSCC taken in the $_i^{th}$ herd-test date and belonging to the $j^{th}$ DIM class;

$\mu$ is the overall mean;

$HTD_i$ is the fixed effect of the $_i^{th}$ herd-test date, i= (146, 178 and, 169 for the first three parities, respectively;

$DIM_j$ is the fixed effect of the $j^{th}$ days in milk where j= 10 classes starting with j = 1 for DIM between 5 and 30d and increased by 1 every 30 days thereafter along the trajectory up to 300d;

b(A) is the effect of the a covariable age at calving on the studied traits and

$e_{ijk}$ is the random residual term associated with each observation.

## RESULTS AND DISCUSSION

Arithmetic means for DMY, SCC (thousands/milliliter) and LSCC and their standard deviations for the first three parities are shown in Table 2.

**Table 2. Arithmetic means (SD) for variables studied in the first three parities**

| Variable | 1st parity | | 2nd parity | | 3rd parity | |
|---|---|---|---|---|---|---|
| | $\overline{X}$ | SD | $\overline{X}$ | SD | $\overline{X}$ | SD |
| **DMY, Kg** | 6.55 | (2.68) | 7.77 | (3.15) | 8.00 | (3.11) |
| **LSCC** | 4.74 | (0.53) | 4.80 | (0.52) | 4.83 | (0.53) |
| **SCC: thousands/milliliter** | 140.6 | (405) | 143.4 | (275) | 153.7 | (272) |

DMY: Daily milk yield; LSCC: $\log_{10}$ SCC; SCC: Somatic cell count.

Daily milk yield (DMY, Kg) increased with parity order. The same trend was reported by Badran *et al.* (2002) for Egyptian buffalo. LSCC means were higher than that obtained by Cerón-Muñoz *et al.* (2002) for Murrah buffaloes (1.13) and are comparable with means (4.0 to 5.4) estimated for dairy cows (Amin *et al.,* 2000; Haile-Mariam *et al.,* 2001 and 2003; Mrode and Swanson, 2003 and Ødegård *et al.,* 2003). Although solutions for parity were not estimated in this study, it was noted that LSCC increased with parity. Generally, the increase in SCC with parity (age) is attributed to the fact that older cows have a greater opportunity for exposure to mastitis causing pathogens than younger cows (Reneau, 1986 and Detilleux *et al.,* 1997). The results of the analysis of variance of the non-genetic effects on daily milk yield and LSCC in the first three parities are presented in Table 3.

**Table 3. Analysis of variance for daily milk yield (DMY, Kg) and $\log_{10}$ SCC (LSCC) in the first three parities**

| Source of variance | d.f | 1st parity | | d.f | 2nd parity | | d.f | 3rd parity | |
|---|---|---|---|---|---|---|---|---|---|
| | | DMY | LSCC | | DMY | LSCC | | DMY | LSCC |
| HTD | 145 | *** | *** | 177 | *** | *** | 168 | *** | *** |
| DIM Classes | 9 | ** | NS | 9 | *** | NS | 9 | *** | NS |
| Reg. On age at calving | 1 | NS | NS | 1 | *** | * | 1 | ** | ** |

HTD: herd-test date; DIM: days in milk.
*Significant ($P$<0.05); **($P$<0.01); ***($P$<0.001); NS= Non significant.

***Herd-test date:***

Both DMY and LSCC were significantly affected (P<0.001) by HTD across the first three parities. This is in agreement with (El-Saeid, 1998 and Nigm *et al.,* 2003) for dairy sheep and dairy cows, respectively. HTD in test-day models permits a relatively good explanation of environmental variation because it is associated with the specific events in the day of test for each herd. Moreover, accuracy ($R^2$) increased by 26 and 68%, respectively for DMY and LSCC when using HTD in the same model instead of herd-year-season (HYS) effect. Similar results were given by Nigm *et al.* (2003).

***Age at calving:***

Age at calving had a significant effect (P<0.05) on both DMY and LSCC in the second and third parities (Table 3), while it had no effect on both traits in the first parity. Age at calving within parity for SCC; have been investigated by many authors (Kenndy *et al.,* 1982; Boethcher *et al.,* 1992; Schutz *et al.,* 1995; Amin *et al.,* 2000 and Haile-Mariam *et al.,* 2001). The authors found that SCC tended to increase with advancing order of lactation and age at calving within parity in a linear fashion. This means that young cows tended to have lower SCC than the multiparous cows. Boettcher *et al.* (1992) added that young cows tended to have highest SCC in short lactations, whereas older cows had highest SCC in complete lactation. Variation in SCC due to the effect of calving age within first parity was higher than within other parities (Amin *et al.,* 2000). Effects like the dilution by milk volume or stage of lactation may also give reasonable interpretation for the increase of SCC with age at test.

***Days in milk (DIM):***

Daily milk yield was significantly affected (P<0.001) by DIM in the first three parities (Table 3). No previous results were available for buffalo. However, the results are in agreement with the findings of El-Saeid *et al.* (1998) for Churra dairy sheep and Nigm *et al.* (2003) for Holstein cattle. The effect of DIM reflects accurately the effect of lactation stage at the time on test milk yield. Table 4 presents least squares means for daily milk yield (DMY) in the first three parities.

**Table 4. Least squares means (±SE) for daily milk yield (DMY) in the first three parities**

| DIM class | 1st parity | | | 2nd parity | | | 3rd parity | | |
|---|---|---|---|---|---|---|---|---|---|
| | No of records | DMY | SE | No of records | DMY | SE | No of records | DMY | SE |
| 1 | 136 | 6.09$^{ab}$ | 0.20 | 194 | 7.76$^{abc}$ | 0.18 | 168 | 8.60$^{ab}$ | 0.19 |
| 2 | 138 | 6.76$^{a}$ | 0.19 | 196 | 8.43$^{a}$ | 0.18 | 174 | 9.10$^{a}$ | 0.19 |
| 3 | 138 | 6.95$^{a}$ | 0.19 | 197 | 8.05$^{ab}$ | 0.18 | 174 | 8.75$^{ab}$ | 0.18 |
| 4 | 137 | 6.85$^{a}$ | 0.19 | 198 | 7.63$^{abc}$ | 0.18 | 173 | 8.02$^{abc}$ | 0.18 |
| 5 | 108 | 6.40$^{ab}$ | 0.22 | 160 | 7.2$^{bcd}$ | 0.20 | 146 | 7.42$^{cde}$ | 0.20 |
| 6 | 87 | 6.41$^{ab}$ | 0.24 | 123 | 6.71$^{cde}$ | 0.23 | 114 | 6.93$^{cd}$ | 0.23 |
| 7 | 59 | 6.60$^{a}$ | 0.29 | 87 | 6.22$^{de}$ | 0.27 | 69 | 6.60$^{cd}$ | 0.29 |
| 8 | 40 | 6.26$^{a}$ | 0.35 | 51 | 5.53$^{e}$ | 0.34 | 32 | 6.17$^{d}$ | 0.42 |
| 9 | 22 | 5.33$^{bc}$ | 0.46 | 27 | 5.94$^{e}$ | 0.46 | 15 | 5.95$^{cd}$ | 0.63 |
| 10 | 13 | 5.70$^{c}$ | 0.59 | 9 | 6.45$^{cde}$ | 0.79 | 4 | 5.57$^{cd}$ | 1.16 |

DIM: days in milk; Means within a column with different superscripts differ significantly (*P*<0.05).

Results in table 4 show that DMY of the first parity increased until the third DIM class followed by a slight insignificant decrease till the fourth one and then decreased significantly until the ninth class. Similar trend was reported by Ibrahim (1995) of Egyptian buffaloes and Haile-Mariam *et al.* (2001) for Australian cows. First parity had a lower daily milk yield (DMY) than those for the second and third parities (Figure 1). Second and third parities have similar trend. DMY increased significantly (P<0.05) till the second DIM class and then decreased significantly to the end of lactation stage.

Estimates of all parities were in close agreement with those reported by Cerón-Muñoz *et al*. (2002) for Murrah buffaloes in Brazil. Similar trends were also reported for Egyptian buffalo by Samak *et al.* (1988), Mansour *et al.* (1993) and Badran *et al.* (2002).

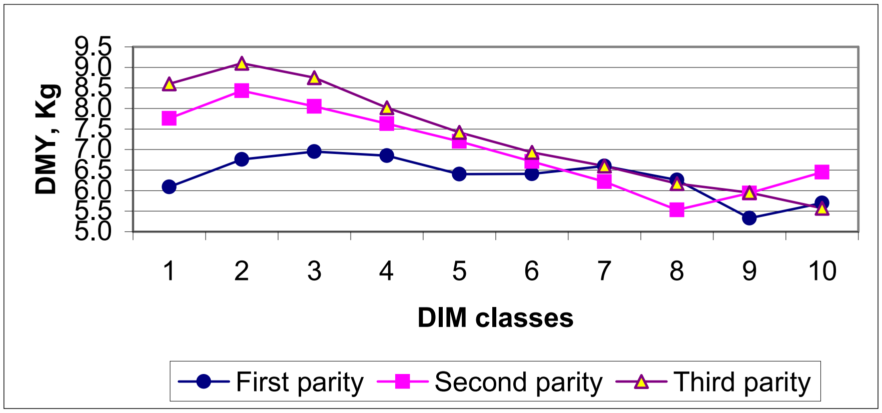


**Figure 1. Change with DIM classes for DMY, kg in the first three parities**

On the other hand, DIM effect was non-significant on LSCC in the three parities. Means are tabulated in Table 5 and their trend is graphically represented in Figure 2. First parity had a different trend than second and third. LSCC decreased reaching its minimum level at the third month. Then the curve fluctuated to the ninth month and then sharply decreased in the tenth one. These results are in good agreement with those reported by Schepers *et al.* (1997) and Cerón-Muñoz *et al.* (2002).

Again, and as for DMY, LSCC had similar trend in the second and the third parities when compared with the 1st one. In all cases, LSCC tended to increase rapidly toward the end the trajectory. The similarity in the lactation curve for 2nd and 3rd lactations compared with the 1st lactation in the current study is in agreement with the results reported by Zhang *et al.* (1994); Reents *et al.* (1995) and Haile-Mariam *et al.* (2001) for dairy cows.

**Table 5. Least squares means (±SE) for $\log_{10}$ SCC (LSCC) in the first three parities**

| DIM class | 1st parity | | | 2nd parity | | | 3rd parity | | |
|---|---|---|---|---|---|---|---|---|---|
| | No of records | LSCC | SE | No of records | LSCC | SE | No of records | LSCC | SE |
| 1 | 136 | 4.85 | 0.05 | 194 | 4.80 | 0.04 | 168 | 4.84 | 0.04 |
| 2 | 138 | 4.74 | 0.05 | 196 | 4.82 | 0.04 | 174 | 4.82 | 0.04 |
| 3 | 138 | 4.68 | 0.05 | 197 | 4.80 | 0.04 | 174 | 4.79 | 0.04 |
| 4 | 137 | 4.80 | 0.05 | 198 | 4.84 | 0.04 | 173 | 4.84 | 0.04 |
| 5 | 108 | 4.73 | 0.05 | 160 | 4.80 | 0.04 | 146 | 4.81 | 0.04 |
| 6 | 87 | 4.81 | 0.06 | 123 | 4.82 | 0.05 | 114 | 4.81 | 0.05 |
| 7 | 59 | 4.70 | 0.07 | 87 | 4.80 | 0.06 | 69 | 4.89 | 0.06 |
| 8 | 40 | 4.85 | 0.09 | 51 | 4.79 | 0.07 | 32 | 4.74 | 0.09 |
| 9 | 22 | 4.95 | 0.11 | 27 | 4.71 | 0.10 | 15 | 4.83 | 0.14 |
| 10 | 13 | 4.72 | 0.14 | 9 | 5.26 | 0.17 | 4 | 5.10 | 0.26 |

DIM: days in milk

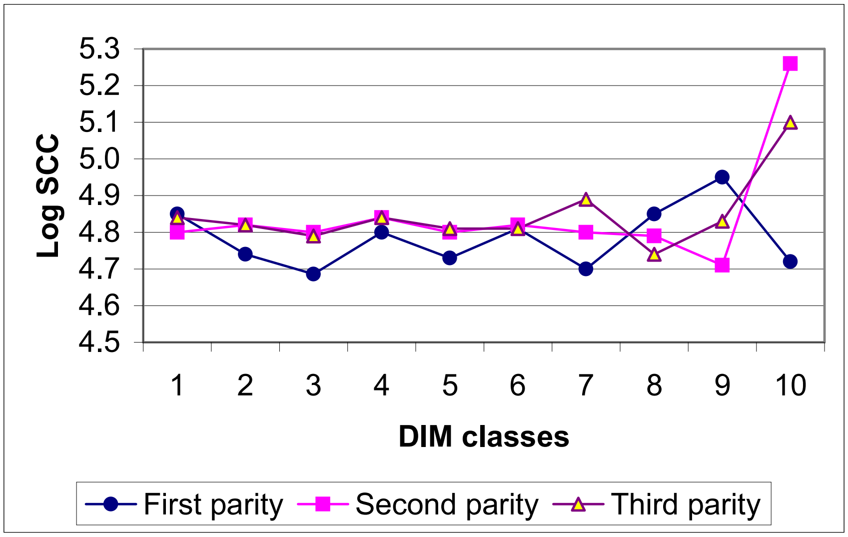


**Figure 2. Change with DIM classes for LSCC in the first three parities**

Cerón-Muñoz *et al.* (2002) described that all parities had a lower (first through fifth) $\log_2$ SCC in the second month of lactation and increased thereafter up to the ninth month for Murrah buffaloes.

In dairy cows, Heuven *et al.* (1988) stated that the variation in SCC in 1st parity is mainly due to normal variation whereas variation in 2nd and latter parities was largely due to incidental factors such as mastitis. However, Haile-Mariam *et al.* (2001) found that later in the 1st lactation and in later lactations, high or increased SCC are largely due to responses to infection which result in more stable elevation and the large temporary environmental effects in early lactation. This also agrees with the result of Detilleux *et al.* (1997) who suggested that the risk of intramammary infection from environmental pathogens, which cause a small increase in SCC, is high at the end of lactation.

Figure 3 presents the phenotypic relationship between means for DMY and LSCC along with DIM in the third parity. The figure demonstrates clearly that the curve of LSCC along DIM trajectory is shaped like an inverted milk production curve. This is also the case in the first two parities. Similar trend in cows was reported by Weller *et al.* (1992), Zhang *et al.* (1994), Reents *et al.* (1995), Haile-Mariam *et al.* (2001) and Cerón- Muñoz *et al.* (2002).

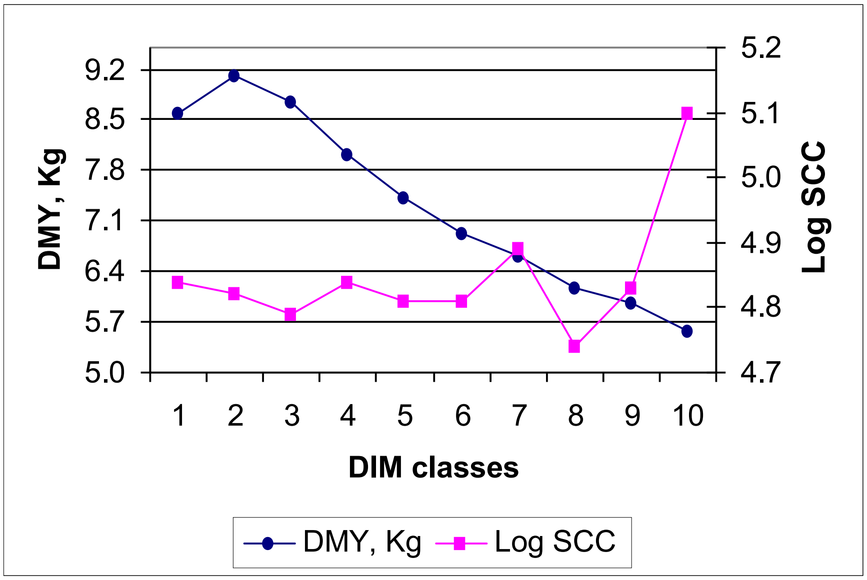


**Figure 3. Trends for DMY, kg and LSCC along with DIM classes in the third parity for Egyptian buffalo**

## CONCLUSIONS

The results indicated that HTD is an important effect in models analyzing test day records for DMY and LSCC. First parity had a different trend for both DMY and LSCC than second and third parities, which had similar trends. Curves for LSCC along the trajectory of DIM in the first three parities of Egyptian buffalo shaped like an inverted milk production curves.

## REFERENCES

Ali, A. K. A. and G. E. Shook. 1980, An optimum transformation for somatic cell concentration in milk. J. Dairy Sci. 63:487-490.

Amin, A. A., S. Mokhtar and T. Gere, 2000. Test-day and whole lactation repeatability for somatic cell count and some milk production traits of Holstein Friesian cows in Hungary. Egyptian J. Anim. Prod.37 (2): 85-97.

Badran, A. E., A. El-Barbary A. E. Mahdy and G. M. Assar, 2002. Genetic and non-genetic factors affecting the lifetime production traits in Egyptian buffaloes. Buffalo J. 2:235-241.

Boettcher, P. J., L. B. Hansen P. M. VanRaden and C. A. Ernst, 1992. Genetic evaluation of Holstein bulls for somatic cells in milk of daughters. J. Dairy Sci. 75:1127-1137.

Cerón-Muñoz, M., H. Tonhati J. Duarte J. Oliveira M. Muñoz–Berrocal and H. Jurado-Gámez, 2002. Factors affecting somatic cell counts and their relations with milk and milk constituent yield in Buffaloes. J. Dairy Sci. 85: 2885-2889.

Detilleux, J., P. Leroy and D. Volckaert, 1997. Alternative use of somatic cell counts in genetic selection for mastitis resistance. Proc. Intl. Workshop on GIFT in Cattle, Health, Uppsala, Sweden. Interbull Bull. 15:34-44.

Eberhart, R. J., R. J. Harmon D. E. Jasper R. P. Natzke S. C. Nickerson J. K. Reneau E. H. Row K. L. Smith and S. B. Spencer,1987. Current concepts of bovine mastitis. 3rd ed. Natl. Mastitis Counc., Inc., Arlington, VA.

El-Saied, U. M., J. A. Carriedo L. F. de la Fuente and F. San Primitivo, 1998. Genetic and environmental estimations for test-day and standardized milk yield of dairy sheep. Small Ruminant Res. 27:209-215.

Haile-Mariam, M., M. E. Goddard and P.J. Bowman, 2001. Estimates of genetic parameters for daily somatic cell count of Australian daily cattle. J. Dairy Sci. 84:1255-1264.

Haile-Mariam, M., P. J. Bowman M. E. Goddard, 2003. Genetic and environmental relationship among calving interval, survival, persistency of milk yield and somatic cell count in dairy cattle. J. Dairy Sci 80: 189-200.

Harmon, R. J, 1994. Physiology of mastitis and factors affecting somatic cell counts. Symposium: Mastitis and genetic evaluation for somatic cell count. J. Dairy Sci. 77:2103-2112.

Heuven, H. C. M., H. Bovenhuis and R. D. Politiek, 1988. Inheritance of somatic cell count and its genetic relationship with milk yield in different parities. Livest. Prod. Sci. 18:115-127.

Ibrahim, M. A. M., 1995. The used of gamma-type function in describing the lactation curve of Egyptian buffaloes. Egyptian J. Anim. Prod.32:113.

International Bull Evaluation Service, 1996. Sire evaluation procedures for non-dairy-production and growth & beef production traits practiced in various countries 1996. INTERBULL Bulletin No. 13. Int. Bull Eval. Serv., Uppsala, Sweden.

International IDF Standard 148A, 1995. Milk Enumeration of Somatic Cells. International Dairy Federation, Brussels, Belgium.

Kennedy, B. W., M. S. Sethar A. K. W. Tong J. E. Moxley and B. R. Downey, 1982. Environmental factors influencing test-day somatic cell counts in Holsteins. J. Dairy Sci. 65:275-281.

Kitchen, B. J., 1981. Review of progress of dairy science: bovine mastitis: milk compositional changes and related diagnostic tests. J. Dairy Res. 48:167-188.

Mansour, H., I. A. Soliman and G. A. Abd El-Haafiz, 1993. Factors affecting lactation curve of buffalo in upper Egypt. Proceeding of the international Symp. on prospects of buffalo production in the Mediterraneana and middle East. Cairo, Egypt Nov., 9-12 1992. EAAP publications. 62:234-237.

Mrode, R. A. and G. J. T. Swanson, 2003. Estimation of genetic parameters for somatic cell count in the first three lactations using random regression. Livest. Prod. Sci. 79: 239-247.

Nigm, A. A., S. A. Attallah S. Abou-Bakr and R. R. Sadek, 2003. Study on applying test day model for genetic evaluation of milk yield of Holstein cattle in Egypt. Egyptian J. Anim. Prod.40 (2): 89-98.

Ødegård, J., G. Klemetsdal and B. Heringstad, 2003. Variance components and genetic trend for somatic cell count in Norwegian Cattle. Livest. Prod. Sci. 79: 135-144.

Reents, R., J. Jamrozik L. R. Schaeffer and J. C. M. Dekkers, 1995. Estimation of genetic parameters for test day records of somatic cell score. J. Dairy Sci. 78: 2847-2857.

Reneau, J. K., 1986. Effective use of dairy herd improvement somatic cell counts in mastitis control. J. Dairy Sci. 69:1708-1720.

Reneau, J. K., and V. S. Packard, 1991. Monitoring mastitis, milk quality and economic losses in dairy fields. Dairy Food Environ. Sanit. 11:4-11.

Samak, M. A., G. A. Hassan A. Hassan and N. Yassen. 1988. The lactation curve and performance of the Egyptian buffalo. Alex. Sci. Exch. 9:83-96.

SAS/STAT® User's Guide, Release 6.12. Edition. 1996. SAS Inst., Inc., Cary, NC.

Schepers, A. J., T. J. G. M. Lam Y. H. Schukken J. B. M. Wilmink and W. J. A. Hanekamp, 1997. Estimation of variance components for somatic cell counts to determine thresholds for uninfected quarters. J. Dairy Sci. 80:1833-1840.

Schutz, M. M., P. M. Van Raden G. R. Wiggans and H. D. Norman, 1995. Standardization of lactation means of somatic cell scores for calculation of genetic evaluations. J. Dairy Sci.78:1843-1854.

Weller, J. I., A. Saran and Y. Zeliger, 1992. Genetic and environmental relationships among somatic cell count, bacterial infection, and clinical mastitis. J. Dairy Sci. 75:2532-2540.

Zhang, W. C., J. C. M. Dekkers G. Banos and E. B. Burnside, 1994. Adjustment factors and genetic evaluation for somatic cell score and relationships with other traits of Canadian Holsteins. J. Dairy Sci. 77:659-665.

# العوامل المؤثرة على تعداد الخلايا الجسدية وعلاقتها بإنتاج اللبن في الجاموس المصري

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*١ – معهد بحوث الإنتاج الحيواني، وزارة الزراعة و استصلاح الأراضي،الدقى ،جيزه، مصر، ٢ – قسم الإنتاج الحيواني كلية الزراعة، جامعة القاهرة، جيزه، مصر.*

استخدم في البحث ٣١٨٩ سجلا شهرياً لعدد ٣٦٤ جاموسة في أربع قطعان بحثية تابعة لمعهد بحوث الإنتاج الحيواني– مصر في الفترة من أكتوبر ١٩٩٩ حتى يونيو ٢٠٠٤، لدراسة العوامل غير الوراثية المؤثرة على صفتي إنتاج اللبن اليومي وتعداد الخلايا الجسدية واتجاهاتها والعلاقة المظهرية بينها خلال مراحل الحليب من اليوم الخامس وحتى اليوم رقم ٣٠٠ في المواسم الثلاثة الأولى للجاموس المصري.

أشتمل النموذج الإحصائي على التأثيرات الثابتة لكل من "القطيع – يوم الاختبار" و الفترة من موسم الحليب (عشر فئات تشير إلى شهور الإنتاج) و معامل انحدار الصفات المدروسة على العمر عند الولادة . قورنت درجة دقة النموذج الإحصائي عند استبدال تأثير "القطيع – يوم الاختبار" بتأثير "القطيع – سنة وموسم الولادة".

أظهرت النتائج تأثيراً عالي المعنوية "للقطيع – يوم الاختبار" على صفتي إنتاج اللبن اليومي و الخلايا الجسد ية في الثلاثة مواسم الأولى. كما ازدادت درجة دقة النموذج الإحصائي عند افتراض تأثير "القطيع – يوم الاختبار" بالمقارنة بتأثير "القطيع – سنة و موسم الولادة". تأثر إنتاج اللبن اليومي معنوياً بالفترة من موسم الحليب بينما لم تتأثر بها الخلايا الجسدية في مواسم الإنتاج الثلاثة. أما العمر عند الولادة لكل موسم فكان معنوي التأثير على إنتاج اللبن اليومي و الخلايا الجسدية في الموسمين الثاني و الثالث و لم يكن له تأثير عليهما في الموسم الأول.

تشابه نمط إنتاج اللبن لمنحنى الحليب للموسمين الثاني و الثالث، و كذلك الحال لتعداد الخلايا الجسدية بينما اختلف نمط إنتاج كلتا الصفتين في الموسم الأول عن الموسمين الثاني و الثالث. أوضحت الدراسة العلاقة العكسية لمنحنى إنتاج اللبن و الخلايا الجسدية في الثلاثة مواسم الأولى للجاموس المصري.