

Natural vs. artificial suckling effects on Zaraibi kids' performance

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ABSTRACT

This work was carried out on Zaraibi kids to investigate the effect of different suckling systems on kids' performance and health status during the suckling period. Forty Zaraibi does (three successive lactations) were selected from El-Serw Station herd and divided into four groups, considering age, milk yield and litter size. Born kids were kept with their dams till being 13 weeks old (free natural suckling, G1). Kids in G2, were separated from their dams one week after birth to be raised artificially on goat's milk. G3 artificially suckled mixed milk (50% goat milk: 50% cow milk) while G4 suckled 100% cow milk.

The obtained data indicate that daily consumption of milk was significantly affected during the first weeks (2nd and 4th weeks) where the highest value was recorded with G1 (405 and 553 ml) while the lowest value was recorded with G4 (345 and 483 ml), respectively. Milk consumption by Zaraibi kids was approximately similar for the 4 groups within the period from 6th to the 8th weeks of lactation, but it was noticeably reduced with the artificial suckling group during the last weeks. In addition, some kids (ranged from 3 to 5) of those artificially suckled groups stopped suckling during the last two weeks, without any adverse effect on their weaning weight.

Weaning weight of quadruplets kids were heavier with artificial suckling (being 10.0, 9.80 and 9.63 kg in G2, G3 and G4, respectively) than natural suckling (9.35 kg). Similarly, the weaning weight of triplet kids was better for the three groups suckled artificially expressed as G2, G3 and G4 (being 10.14, 9.90 and 9.70kg, respectively) compared with G1 (natural suckling, 9.52 kg). The mortality rates were

8.70, 9.09, 13.04 and 17.39 % for G1, G2, G3 and G4, respectively. The cases of mortality recorded the highest estimate among triplet kids and quadruplets kids especially during the first weeks of suckling especially in G4. Generally, both groups of natural suckling (G1) and artificial suckling on goats milk (G2) had reduction in incidence of bloat (indigestion) and diarrhea (digestive disturbances), thus showed less mortality rate among kids.

Accordingly, artificial rearing seems a good alternative for young kids especially for those born twins and more or when early weaning is demand. However, in case of economics push to save goat milk and replace it with cow milk, more studies are needed since results showed high mortality in kids when using it for suckling

Key words: Zaraibi kids - suckling systems – kids mortality rate – kids weaning weight – digestive disturbances

INTRODUCTION

Egyptian-Nubian goats are considered of high genetic potential as dairy and prolific breed (Aboul-Naga *et al.*, 1993). Coping with this high production and output needs proper feeding and good management (Devendra, 1987). Some research works (Ahmed *et al.*, 2003, Shehata *et al.*, 2007_a, Abdelhamid *et al.*, 2011 and Ahmed *et al.*, 2012) reported increased rate of losses in twin kids of Zaraibi goats. On the other hand, the increased demand to process goat' milk and intensification of dairy goat production requires developing tools able to save suckling milk without sacrificing viability of young kids if not improving it. Accordingly, the present study target to test viability of kids with some rearing systems able to save part of the milk consumed for suckling.

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MATERIALS AND METHODS

Forty Zaraibi does in the 2nd, 3rd and 4th lactation seasons were selected from El-Serw Station herd and divided into four groups, considering age, milk yield and litter size. Born kids were weighed at birth then weekly. Born kids were allowed suckling dams for one week then we used four different rearing systems during the remained suckling period which extended about 90 days as follow:

G₁: Free suckling, where born kids were kept with their dams till being 13 wks old, while suckling was allowed all the day.

G₂: Artificial suckling on goat's milk.

G₃: Artificial suckling on 50% goat's milk plus 50% cow's milk.

G₄: Artificial suckling on 100% cow's milk.

Kids under artificial suckling systems were separated from their dams and allowed to suck *ad-libitum* at fixed times (4 times in 1st month, 3 times in 2nd month and 2 times in 3rd month) as reported by Ahmed *et al.* (2003). Kids were kept in separate cages to facilitate proper management. Starter mixture and berseem hay were available after the first month of suckling. Milk samples were taken weekly from all groups at morning and evening milking, then all samples were composed to be analyzed for chemical composition (total solids -TS, fat, protein, solids non-fat -SNF & Ash) as well as pH and acidity which determined as given by Ling (1963) and lactose content as described by Barnett and Abd El-Tawab (1957).

Data were statistically analyzed using SAS (2003). The significant differences among means were assigned according to Duncan (1955).

RESULTS AND DISCUSSION

Milk composition

Milk composition of different experimental treatments are summarized in Table (1). Analysis showed insignificant differences in milk composition and parameters measured among the four groups. However, fat % and total solids% in natural suckling group

(G₁) (3.73 and 11.93%) were slightly less than in artificial suckling group (G₂) (3.77 and 12.02), respectively. This may be due to the increase of daily milk yield with natural suckling compared to artificial suckling as reported by Ahmed *et al.* (2003) that using natural suckling led to significantly more average daily milk yield than artificial suckling especially during the first weeks of lactation and, consequently, milk fat percentage was decreased. Similar results were observed also by El-Feel and Marzouk (1998). Moreover, Peris *et al.* (1997) reported that both milk fat and total solids percentages were affected by suckling systems (natural or artificial).

Analysis showed that composition of Baladi cow milk was approximately similar to goat milk, as shown in Table (1). The obtained values of milk constituent are within the normal range given by Shehata *et al.* (2004 and 2007_a), Abdelhamid *et al.* (2011) and Ahmed *et al.* (2012) for Zaraibi goats and Etman *et al.* (2007) and El-Tahan (2007) for lactating cows.

Table (1) indicates also that the measured milk quality parameters (acidity, pH value and somatic cell count-SCC) did not markedly differ as a result of rearing system (natural or artificial) and/or type of milk consumed. This result encourages implementation of artificial suckling as far as hygienic precaution are considered without fear of negative impact on livability of kids. Shehata *et al.* (2004) measured SCC for dairy Zaraibi goats as 459×10^3 cells/ml, which is comparable with the medium level (415×10^3 cells/ml) of the physiological standards established for goats (Perntaner *et al.*, 1991). Generally, the obtained values in this study are comparable with those given by Shehata *et al.* (2006) and Ahmed *et al.* (2008 and 2011) for Zaraibi goats and Simpson *et al.* (1995) for cows.

Kids performance

Milk consumption

Fig. (1) shows the effect of suckling systems on milk consumption by Zaraibi kids which also were statistically evaluated but not presented. It was noticed that milk consumption

was the highest ($P < 0.05$) with natural suckling (G1) most weeks.. Meanwhile, the artificial

Table (1) : Milk composition and some milk quality parameters for the tested treatments.

Items	Treatments			
	G ₁	G ₂	G ₃	G ₄
Milk composition (%):				
Fat	3.73	3.77	3.69	3.61
Protein	2.89	2.92	2.87	2.85
Lactose	4.61	4.63	4.57	4.53
Total solids	11.92	12.02	11.80	11.64
Solids non fat	8.19	8.25	8.11	8.03
Ash	0.69	0.70	0.67	0.65
Milk quality:				
Somatic cell count's (SCC) x10 ³	401	393	387	379
Acidity, %	0.157	0.160	0.163	0.165
pH value	6.61	6.59	6.57	6.53

No symbols subscripted means insignificance of difference among means.

G1: Free suckling

G2: Artificial suckling, (AS) (goat milk)

G3: AS (50% goat milk+50% cow milk)

G4: AS (cow milk)

reared groups consumed less milk as percentage of cow milk increased.

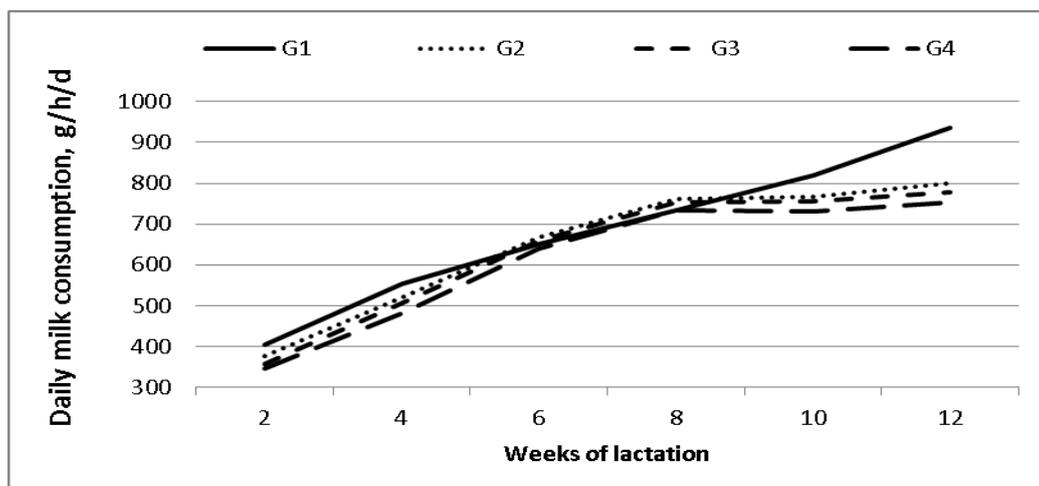
Milk consumption increased gradually by progress of weeks in natural suckling group while artificial suckling groups showed the same increasing consumption rate till week 8th then slightly increased till end of suckling suggesting that artificial suckling encourage shifting to consume ration earlier than natural suckling.

Pattern of feed intake of both starter and berseem hay consumed by artificial suckling groups confirm this suggestion as they

increased parallel to decrease of milk suckled. In addition, it was noticed that 3 to 5 of the kids artificially suckling stopped suckling during the last two weeks (12th and 13th week). Thus, artificial suckling seemed encouraging Zaraibi kids to be early weaned.

Body weight of Zaraibi kids

Fig. 2 presents body weights of kids measured biweekly for different sucking groups. In general, narrow differences were noticed among all groups in body weights and all kids had the same trend of gradual increase by time.



G1: Natural suckling

G2: Artificial suckling, goat milk

G3: Artificial suckling, 50% goat milk+50% cow milk

G4: Artificial suckling, cow milk

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Fig. (1): The effect of suckling systems on daily consumption by born Zaraibi kids.

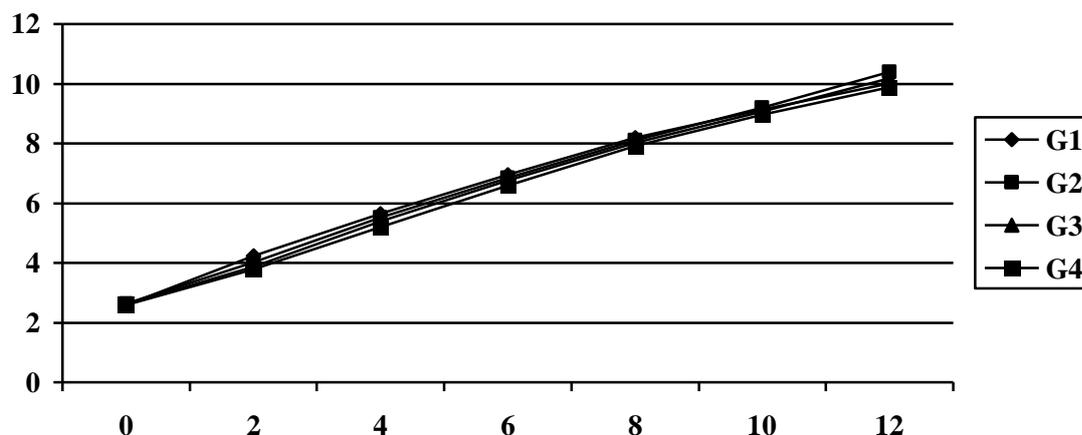


Fig. (2): The effect of suckling systems on body weight changes of born Zaraibi kids

The parallel growth performance of all groups though the previously reported differences in suckling milk consumed either due to natural or artificial suckling or due to type of milk suckled confirm that kids were successful in maintaining their growth trend with all tested sucking packages. Meanwhile, consumption of feeds (concentrate and berseem) seemed compensating changes in intake of milk.

Fig 3 and Table 2 show that only single born kids had more weaning weights compare to other birth type kids. Artificial suckling gained better weaning weights than natural suckling with triplet and quadruplet kids while single and twin kids gained more weaning weights with natural suckling. Though differences in weaning weights were not significant there was a repeated trend that sucking goat milk attained better weights than sucking mixed milk then least weight with cow milk.

These results confirm the statement that as litter size increased artificial suckling offer better opportunity for kids to attain their requirement of milk and avoid kids the poor mothering ability and care accompanied increasing litter size.

In other comparative study by Abdelhamid *et al.* (1999), they found that the

average TBG was 12.34 kg for *ad-libitum* feeding, while it was 9.27 and 9.01 kg for high and low concentrate of restricted rations. Similar results were obtained for Zaraibi kids by Zeid (1998), Shehata *et al.* (2007_b) and Abdelhamid *et al.* (2011) on born Zaraibi kids. Generally, the TBG and DBG followed the same trend obtained for weaning weights.

Health status

Mortality rate

Mortality rate (Table 3) was the least with natural suckling (8.70%), followed with small difference by G₂, suckled goat milk, (9.09) then G₃, suckled mixed milk, (13.04%) and the highest in G₄, suckled cow milk (17.39 %). This result may be due to increasing incidence of digestive disturbances (diarrhea and blot) in G₄ then G₃ compared with G₁ and G₂ as shown in Table (4).

Moreover, it was noticed that losses was concentrated among triplet and quadratic kids while no losses among single and twin born kids.

Literature gave high mortality of born kids, with natural suckling, ranged from 30.8 to 65 % in desert goats (Salama, 1993) and reached 25% in Baladi goats (Gihad *et al.*, 1985), while did not exceed 18% in Zaraibi goats as reported by Abdelhamid *et al.* (1999).

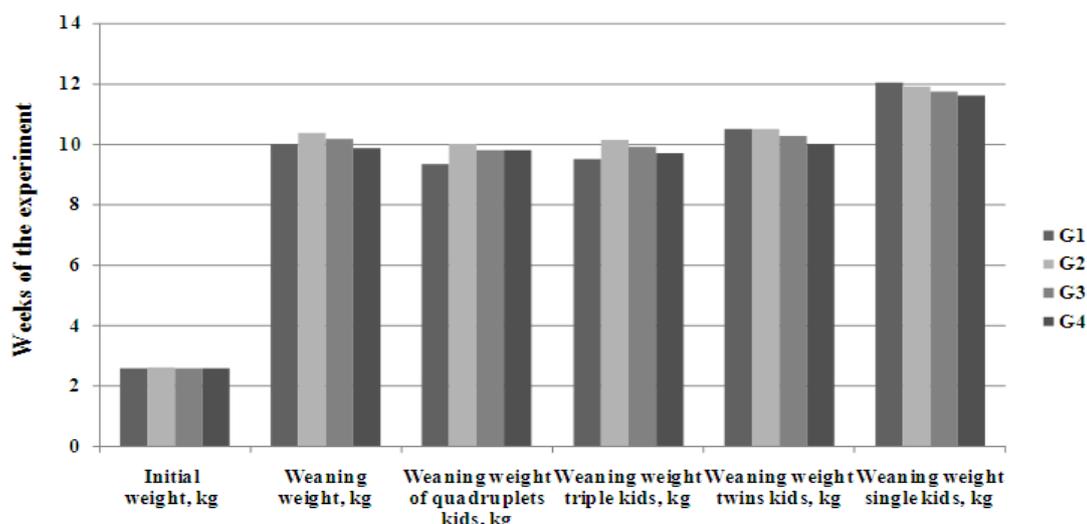


Fig. (3): The effect of suckling systems on weaning weight changes of Zaraibi kids

Table (2) : Performance of Zaraibi kids as affected by different experimental schemes.

Items	Treatments			
	G ₁	G ₂	G ₃	G ₄
No. of does	10	10	10	10
Single kidding No.	2	2	2	2
Twins kidding No.	3	3	3	3
Triple kidding No.	4	4	4	4
Quadruplets kidding No.	1	1	1	1
Born kids no.	24	24	24	24
Alive kids at birth*	23	23	23	23
Birth weight, kg	1.95±0.05	2.00±0.06	2.09±0.07	1.98±0.07
Alive kids at 7 days**	23	22	23	23
Initial weight, kg	2.58±0.08	2.64±0.07	2.60±0.09	2.59±0.09
Weaning weight, kg	10.02±0.25	10.39±0.20	10.19±0.22	9.89±0.24
Weaning weight of quadruplets kids, kg	9.35±0.23	10.00±0.29	9.80±0.40	9.63±0.58
Weaning weight triple kids, kg	9.52±0.30	10.14±0.28	9.90±0.31	9.70±0.33
Weaning weight twins kids, kg	10.50±0.30	10.50±0.33	10.28±0.32	10.00±0.35
Weaning weight single kids, kg	12.05±0.05	11.90±0.40	11.75±0.75	11.60±0.90
Total body gain of kids, kg	7.40±0.20	7.71±0.16	7.54±0.18	7.28±0.18
Daily body gain of kids, g	81.37±2.22	84.73±1.79	82.80±1.98	80.05±2.00

*Still birth in each group. ** Dead kid in G2 at 1st week

3-2- Digestive disturbances:

The obtained data on incidence of diarrhea and bloat in Zaraibi kids during suckling are summarized in Fig 4 and Table (4). The data revealed increasing incidence of diarrhea during the first 21 days then it started to reduce in all groups. Bloat incidence

increased in all groups till day 14th then started to reduce. It was noticed that frequency of both diarrhea and bloat gradually reduced until day-63, while slight increase occurred in the last week before weaning. Fig 4 shows clearly that incidence of diarrhea and bloat were the highest in G4 then G3, G2 and the least in G1.

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In this respect, Ahmed (1999) observed that incidence of diarrhea in new born kids was higher during the first weeks of suckling period and that incidence of diarrhea ranged from 20 to 28 cases according to the nutrition system. Meanwhile, Abdelhamid *et al.* (1999)

and Shehata *et al.* (2007_b) found that more than 70% of the bloat cases took place during the first month of suckling but they reported less incidence of bloat than that reported in the present study.

Table(3): The effect of suckling methods on the mortality of kids during suckling period.

Incidence of death	Treatments			
	G1	G2	G3	G4
A live kids at 7 days (Initial)*	23	22	23	23
Mortality of quadruplets kids	1	1	0	1
Mortality of triple kids	1	1	3	3
Mortality of twins kids	0	0	0	0
Mortality of single kids	0	0	0	0
Kids death until weaning	2	2	3	4
Mortality% of kids	8.70	9.09	13.04	17.39

*One kid dead in G2 during 1st week before start of the experiment. G1: Natural suckling

G2: Artificial suckling, goat milk

G3: Artificial suckling, 50% goat milk+50% cow milk

G4: Artificial suckling, cow milk

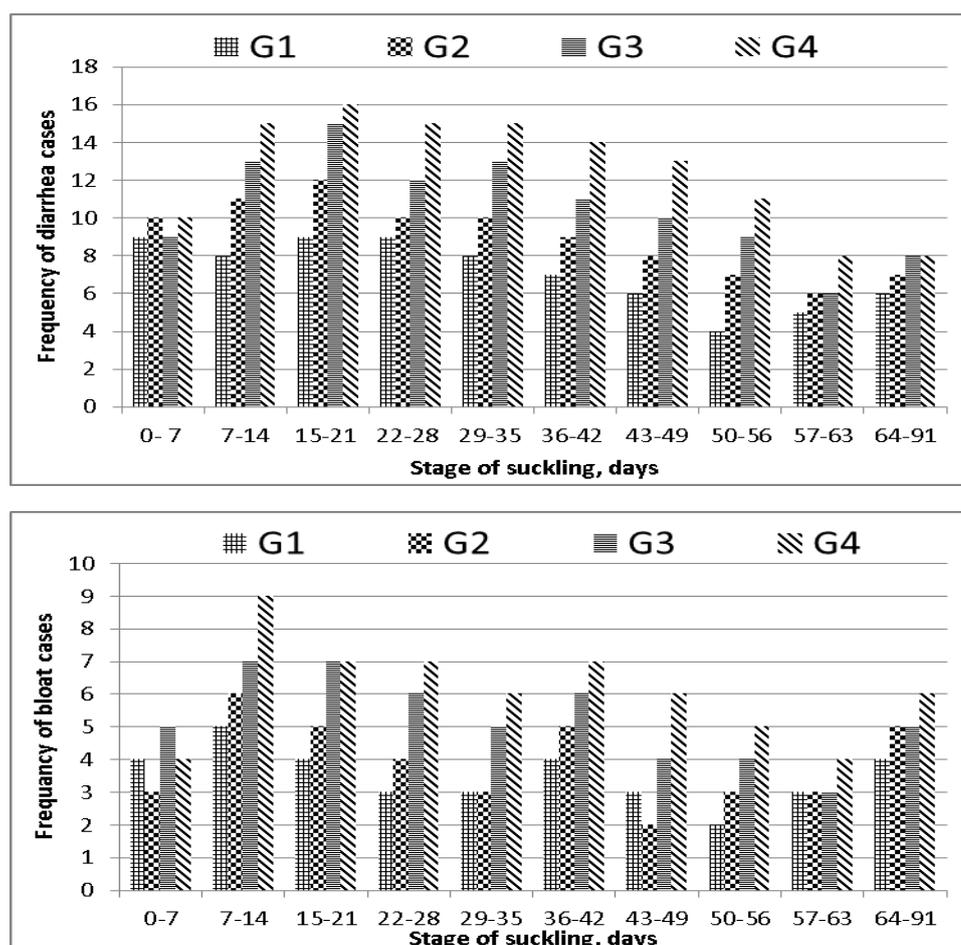


Fig. 4: Incidence of diarrhea and bloat in Zaraibi kids for different suckling regime during the suckling period

Table (4): Effect of suckling method on frequency of digestive disturbances cases in born Zaraibi kids during the experimental period.

Disease	Treatments			
	G1	G2	G3	G4
Diarrhea incidence	71	90	106	125
Bloat incidence	35	39	52	61

CONCLUSION

Results prove that artificial rearing seems a good alternative for young kids especially for those born twins and more or when early weaning is demand. However, in case economics push to save goat milk and replace it with cow milk for suckling, more studies are needed since results showed high mortality in kids when using cow milk.

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مقارنة تأثير الرضاعة الطبيعية والصناعية على أداء الجداء الزرايبي.

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أبقار بلدي في المجموعة الثالثة (مج3) ، 100% لبن أبقار بلدي دمياطي في المجموعة الرابعة (مج4).

وكانت أهم النتائج :

- استهلاك الجداء من اللبن تأثر معنويا خلال الأسابيع الأولى (الأسبوع الثاني ، الأسبوع الرابع) ، حيث سجلت أعلى قيمة في المجموعة الأولى (405 ، 553 على التوالي) بينما سجلت أقل قيمة مع مج4 (345 ، 483 على التوالي) ، أيضا استهلاك الجداء الزرايبي اللبن كانت متساوية تقريبا بين المجموعات خلال الفترة من 6 - 8 أسابيع من فترة الحليب ولكنها انخفضت مرة أخرى وبصورة ملحوظة في كل

هذا العمل البحثي على الماعز الزرايبي يهدف لاختبار تأثير بعض نظم الرضاعة المختلفة على أداء الجداء المولودة والحالة الصحية أثناء فترة الرضاعة، لذلك تم اختيار 40 عنزة وجدانها المولودة بهدف اختبار أربع نظم للرضاعة في أربعة مجموعات ، هي نظام الرضاعة الطبيعية : وفيها تركت الجداء طليقة مع أمهاتها طوال الوقت (مج1) ، أما نظام الرضاعة الثاني وفيه تترك الجداء مع أمهاتها لمدة أسبوع واحد ثم تفصل نهائيا لترضع صناعيا على لبن الماعز (مج2) ، وقد اتبع نظام الرضاعة الصناعي أيضا في المجموعة الثالثة والرابعة ولكن اختلف نوع اللبن فقط ليكون 50% لبن ماعز + 50% لبن

على التوالي). حالات النفوق سجلت أعلى معدلاتها بين الثلاثي والرابعي خاصة في الأسابيع الأولى من فترة الرضاعة خاصة في المجموعة الرابعة، أيضا الرضاعة الطبيعية والرضاعة الصناعية على لبن الماعز (مج2) قللت من فرصة الإصابة بحالات النفوخ والإسهال (الإضطرابات الهضمية) وبالتالي انخفضت معدلات النفوق في الجداء حديثة الولادة .

من هذه الدراسة يتبين أن الرضاعة الصناعي للجداء الزرايبي تعتبر بديل جيد للرضاعة الطبيعي خاصة مع الأمهات التي تعطى توامية عالية أو عند الحاجة للفظام المبكر، وإن دعت الضرورة الاقتصادية لاستخدام لبن الأبقار بدلا من لبن الماعز فإن الأمر يحتاج مزيد من الدراسة مع ارتفاع نسبة النفوق عند استخدام اللبن البقري في الرضاعة الصناعي.

مجموعات الرضاعة الصناعية خلال الأسابيع الأخيرة. بالإضافة الى بعض الجداء (التي تتراوح ما بين 3-5 جداء) من كل مجموعات الرضاعة الصناعية توقفت عن الرضاعة خلال الأسبوعين الأخيرين بدون أدنى تأثير على الوزن عند الفطام.

- فيما يتعلق بالوزن عند الفطام للجداء الرباعي كانت أعلى مع الرضاعة الصناعي (10.0 ، 9.80 ، 9.63 كجم في المجموعات مج 2 ، مج 3، مج 4 على التوالي) مقارنة بالرضاعة الطبيعي (9.35 كجم). أيضا وزن الفطام للجداء الثلاثي أفضل مع الرضاعة الصناعي (10.14، 9.9، 9.70 كجم في مج2، مج3، مج4 على التوالي) مقارنة مع مج1 (9.52 كجم).

- إما فيما يتعلق بمعدل النفوق فقد سجل (8.70، 9.09، 13.04، 17.39 % في المجموعات مج1، مج2، مج3، مج4

Natural vs. artificial suckling effects on Zaraibi kids' performance