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HYGIENIC ASPECTS ON FUNGAL CONTAMINATION OF MILKING ENVIRONMENT OF SOME DAIRY FARMS

Moustafa M. Ahmed and Sotohy A. Sotohy

Dept. of Animal Hygiene, Fac. of Vet. Medicine, Assiut University

ABSTRACT :

Dairy environment is an integral part of dairy herd management and milk production. Proper management of herd health involves, preventing animal infection and milk contamination. The present investigation was conducted in three different dairy farms in Assiut Province, included Fac. of Agriculture; Fac. of Vet. Medicine and Secondary School of Agriculture. A total number of 432 random samples (represented by 72 samples of air; 72 wall surfaces swabs; 72 udder and teat surfaces swabs; 54 milker's hands swabs; 18 teat cups swabs; 72 milk equipments swabs and 72 milk samples) were collected from the milking units of the experimented dairy farms and examined mycologically to evaluate the distribution of pathogenic and potentially pathogenic moulds and yeasts and their role in milk contamination. Variable loads of total mould and yeast counts/unit were detected. Maximum mean count of total moulds and yeasts of 3.52 $x10^4$ ±1.26 / m^3 was estimated in air samples, while minimum mean count of 2.6 x10 ± 0.78 / ml was detected in milk samples of the milking stalls of Vet. Medicine Hospital. Maximum of total mould and yeast counts were ($6x10^4$ / $m^{3)}$ in air samples of the milking premise of Vet. Medicine Hospital, and (6 x 10^4 / $m^{2)}$ in inner wall surfaces swabs; ($4.2x10^4$ / $m^{2)}$ in udder and teat surfaces swabs in Fac. of Agriculture farm. Minimum of total mould and yeast counts were (0.1x10 / ml) and (0.2x10 / ml) in examined milk sampled from Secondary School of Agriculture and Fac. of Vet. Medicine farms respectively. Wide varieties of 790 isolates of fungi and yeasts belonged to 13 genera of moulds and yeasts could be isolated from all examined specimens with variable incidence and frequency percentages of major animal and public health significance included Aspergilli (*A. flavus; A. fumigatus; A. clavatus; A. glaucus; A. candidum; A. terreus; A. versicolor* and *A. niger); Cladosporium; Pacilomyces; Mucor; Curvolaria; Trichoderma; Microsporum gypseum; Trichophyton terrestre; Penicillium* (*P. chrysogenum; P. citrinum; P. funiculosum and P. species); Cladosporum; Fusarium; Alternaria; Demataciae; Rhodotorula; Candida albicans* and other mould and yeast species. The obtained results revealed a positive correlation between the load of fungal contamination of milk and contamination loads of its surrounding environment that represented by the high counts of moulds and yeasts in examined milk samples which were also corresponded by high mould and yeast counts of the same pattern in case of examined swabs of the inner wall surfaces; udder and teat surfaces and milker's hands.

The major of animal and public health significance of the isolated mould and yeast

contaminants from the examined dairy units and milk, as well as the preventative measure and hygienic recommendations were discussed.

INTRODUCTION:

Looking at the dairy environment is the area that is most often forgotten. The milking environment is probably second in importance and mainly concerned to the milking procedures. But it must also be looked for scrupulous hygiene regimes and at where the dairy animals are milked and housed (Smith, 1985 and Reneau *et al.*, 1987).

The conditions of surrounding environment in the intensively confined dairy animals can markedly influence the massive incidence of several pathogenic and potentially pathogenic microorganisms specially when large number of animals are allowed to house in unhygienic condition (Quigley *et al.*, 1995). Wide varieties of fungal species including *Aspergillus; Penicillium; Mucor; Cladosporum; Fusarium; Demataciae; Alternaria; Canidiospores; Basidiospores* and others of pathogenic, opportunistic or saprophytic moulds and yeasts had been isolated from the environment of different animal enclosures (Amin, 1980; Baruah, 1961; Hafez, 1976; Lacey & Lacy, 1964; Kotimaa *et al.*, 1978; Negulescu *et al.*, 1961; Ogunlana, 1975; Steermula, 1961 and Zakaria *et al.*, 1980). The risk of pathogens spreading in animal environment can be influenced by incorrect operation; use of contaminated milking equipment; unsatisfactory milking management practices and unhygienic environment (John, 2001). Some moulds are wonderfully modest and adaptable even to unfavorable conditions. In some cases the highly alkalic or acidic reactions are not represent any obstacle for fungal spores dissemination in surrounding environment (Muller, !957 and Alksandrov & Peev, 1974)). Moulds and yeasts are ubiquitous in nature and can access to the animal environment causing a wide variety of diseases or mycotoxicoses as result of the harmful effect of mycotoxins which are the secondary metabolites of mould fungi and may reach milk leading to its contamination and deterioration (Betina, 1998 and Hintikka & Nikulin, 1998).

The aim of the present investigation was conducted due to the scanty of available literature and information concerning the extent of mycological contamination of milking environment in our local dairy farms and to evaluate the hygienic condition of the milking environment of some dairy farms in Assiut Province with particular concern to the keeping quality of milk production and its contamination with environmental moulds and yeasts with the emphasis on their hazard effects of major animal and public health significance.

MATERIALS AND METHODS:

Experimental Dairy Farms :

The present investigation was conducted in three different dairy farms at Assiut Province. The construction of the experimented dairy farms included:

1-Faculty of Agriculture Farm : The farm accommodated for total 676 animals of which 121 were lactating and milked. Animals were housed in open yard system in dirty floor and supplied with milking unit. The lactating caws were milked manually.

2-Faculty of Vet. Medicine Farm : The farm accommodated for total 20 animals of which 11 were lactating and milked. Animals were housed in stalls of concrete floor (cow-house system). The stalls mainly used for milking and housing. The lactating caws were milked manually.

3-Secondary School of Agriculture: The farm accommodated for total 40 animals of which 18 were lactating and milked. Animals were housed in open yard system of dirty floor and supplied with milking parlour which holding a pipeline milking machine with teat cups (Alfa – Laval System). The lactating caws were milked automatically.

Sampling and mycological examination of specimens:

A total number of 432 random samples (represented by 72 samples of air; 72 wall surfaces swabs; 72 udder surfaces swabs; 54 milker's hands swabs; 18 teat cups swabs; 72 milk equipments swabs and 72 milk samples) were collected under complete aseptic condition from milking units of the three experimented dairy farms in Assiut Province. The obtained specimens were kept separately cooled and carried to the laboratory with a minimum of delay for the mycological examination, using Sabouraud dextrose agar and Dicloran rose-bengal medium of King *et al.* (1979).

The mycological examination of environmental samples included :

1-Air samples: Seventy-two air samples were collected from the tested milking units using sterile liquid impingers supplied with electric counter vacuum pump. The technique used by Cown *et al.* (1956) and Brachman *et al.* (1964) was adopted.

2-Wall surfaces: Seventy-two swabs were collected from the inner surfaces of the building of the examined milking units aseptically, according to Rendos *et al.* (1975). The swabs were inoculated into sterile test tubes, each containing sterile 10 ml of nutrient broth.

3-Udder swabs: Seventy-two udder and teat swabs were collected from dairy cows just before milking time, according to Rendos *et al* (1975). The swabs were inoculated into sterile test tubes containing sterile nutrient broth.

4-Milker's hands : Fifty-four swabs were collected from the milker's hands. Each sterile swab moisten with 10 ml. of sterile broth was rubbed on the skin surface of the palm.

5-Teat cups: Eighteen swabs were collected from the inner surfaces of teat cups of the milking machine, just before milking time.

6-Milk utensils (equipments): Seventy-two swabs were collected from the inner surfaces of milk utensils just before milking time.

7-Milk samples: Seventy-two milk samples were collected in sterile Mekarteny bottles under complete aseptic condition.

The total mould and yeast counts/unit : were done according to the technique described by Cruickshank *et al.* (1980) and Johnson and Curl (1972).

The mycological examination and identification of the isolated fungi and yeasts : were carried out according to Arx *et al.*(1977); Barnett & Hunter (1972); Domsch *et al.* (1980) ;Kozakiewicz (1989); Kulik (1968); Lodder (1971); OH *et al.* (1975); Raper & Fennell (1965); Raper & Fennell (1977); Samson *et al.* (1976); Samson (1979); Sivanesan (1987); Talbot (1971); Treagan & Pulliam (1982) and Zycha *et al.* (1969).

RESULTS:

The obtained results are illustrated in Tables (1, 2, 3 and 4).

Table (1) : Statistical mean values of the total mould and yeast counts of milking environment of examined dairy farms.

Sampling Specimens	No. of Examined samples	Count/Unit	Location of examined dairy farms		
			Fac. of Agriculture Assiut Province	Fac. of Vet. Med. Hospital Assiut Province	Secondary School of Agriculture Assiut Province
Air / m^3	72	Minimum Maximum Mean	3.4×10^2 1.6×10^4 $0.97 \times 10^4 \pm 0.30$	1.2×10^2 6.0×10^4 $3.52 \times 10^4 \pm 1.26$	2.2×10^2 8.0×10^3 $5.96 \times 10^2 \pm 1.63$
Wall surfaces /m^2	72	Minimum Maximum Mean	3.1×10^2 6.0×10^4 $2.81 \times 10^4 \pm 1.64$	1.9×10^2 2.4×10^4 $1.80 \times 10^4 \pm 0.50$	2.1×10^2 2.8×10^4 $1.44 \times 10^4 \pm 0.64$
Udder surfaces /m^2	72	Minimum Maximum Mean	3.2×10^2 4.2×10^4 $2.09 \times 10^4 \pm 0.98$	3.2×10 2.0×10^4 $1.29 \times 10^4 \pm 0.40$	2.0×10 8.0×10^2 $5.64 \times 10^2 \pm 1.60$
Milker's hands /palm	54	Minimum Maximum Mean	1.1×10 7.2×10^2 $3.94 \times 10^2 \pm 1.38$	1.2×10 1.0×10^2 $6.72 \times 10 \pm 1.74$	0.0 0.0 0.0
Teat cups /m^2	18	Minimum Maximum Mean	0.0 0.0 0.0	0.0 0.0 0.0	8.0×10 2.2×10^2 $1.84 \times 10^2 \pm 0.29$
Milk utensils/ m^2 (Equipments)	72	Minimum Maximum Mean	1.7×10^2 2×10^4 $1.28 \times 10^4 \pm 0.37$	3.4×10 3.2×10^4 $1.46 \times 10^4 \pm 0.80$	4.3×10 1.2×10^3 $0.81 \times 10^3 \pm 0.24$
Milk / ml	72	Minimum Maximum Mean	0.3×10 1.3×10^2 $8.74 \times 10 \pm 2.50$	0.2×10 4.0×10 $2.6 \times 10 \pm 0.78$	0.1×10 7.0×10 $5.3 \times 10 \pm 1.47$
Total	432				

Table (2): Incidence percentages and frequency distribution of isolated moulds and yeasts in milking environment samples (Faculty of Agriculture dairy farm , Assiut University

) °ıÆ°# ,¹ǂ°–ˇı#	Examined samples of milking environment																				
	Air (45 samples)			Walls (45 samples)			Udder (45 samples)			Milker's hands (45 samples)			Equipments (45 samples)			Overall percentages (225 samples)			Milk (45 samples)		
	No. of Isolates	Inc %	Frq %	No. of Isolates	Inc %	Frq %	No. of Isolates	Inc %	Frq %	No. of Isolates	Inc %	Frq %	No. of Isolates	Inc %	Frq %	Total Number	T.I %	T.F %	No. of Isolates	Inc %	Frq %
Aspergillus flavus	2	1.94	4.44	4	2.88	8.89	2	3.64	4.44	1	4.17	2.22	3	5.00	6.67	12	3.15	5.33	2	6.67	4.44
Aspergillus fumigatus	6	5.82	13.3	10	7.19	2.22	3	5.45	6.67	2	8.33	4.44	5	8.33	11.1	26	6.82	11.5	1	3.33	2.22
Aspergillus niger	18	17.5	40.0	20	14.4	4.44	9	16.4	20.0	7	29.2	15.5	8	13.3	17.8	62	12.3	27.5	5	16.7	11.1
Aspergillus terreus	2	1.94	4.44	3	2.16	6.67	1	1.82	2.22	0	0.00	0.00	0	0.00	0.00	6	1.57	2.67	0	0.00	0.00
Aspergillus glaucus	1	0.97	2.22	2	1.44	4.44	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	3	0.79	1.33	0	0.00	0.00
Aspergillus clavatus	2	1.94	4.44	3	2.16	6.67	0	0.00	0.00	0	0.00	0.00	1	1.67	2.22	6	1.57	2.67	0	0.00	0.00
Aspergillus candidum	3	2.91	6.67	2	1.44	4.44	1	1.82	2.22	0	0.00	0.00	0	0.00	0.00	6	1.57	2.67	0	0.00	0.00
Aspergillus sydowi	2	1.94	4.44	4	2.88	8.89	1	1.82	2.22	0	0.00	0.00	2	3.33	4.44	9	2.36	4.00	0	0.00	0.00
Aspergillus ustus	1	0.97	2.22	3	2.16	6.67	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	4	1.05	1.78	0	0.00	0.00
Aspergillus versicolor	3	2.91	6.67	4	2.88	8.89	1	1.82	2.22	0	0.00	0.00	1	1.67	2.22	9	2.36	4.00	0	0.00	0.00
Cladosporium species	9	8.74	20.0	11	7.91	24.4	6	15.9	13.3	3	12.5	6.67	4	6.67	8.89	33	8.66	14.7	3	10.0	6.67
Paeciliomyces voriotti	3	2.91	6.67	5	3.60	11.1	1	1.82	2.22	0	0.00	0.00	3	5.00	6.67	12	3.15	5.33	1	3.33	2.22
Fusarium oxysporum	1	0.97	2.22	3	2.16	6.67	1	1.82	2.22	0	0.00	0.00	1	1.67	2.22	6	1.57	2.67	0	0.00	0.00
Fusarium solani	2	1.94	4.44	2	1.44	4.44	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	4	1.05	1.78	0	0.00	0.00
Scopulariopsis brevicaulis	3	2.91	6.67	1	0.72	2.22	1	1.82	2.22	0	0.00	0.00	1	1.67	2.22	6	1.57	2.67	1	3.33	2.22
Scopulariopsis candida	1	0.97	2.22	2	1.44	4.44	0	0.00	0.00	1	4.17	2.22	1	1.67	2.22	5	1.31	2.22	0	0.00	0.00
Curvolaria species	3	2.91	6.67	2	1.44	4.44	1	1.82	2.22	0	0.00	0.00	1	1.67	2.22	7	1.84	3.11	1	3.33	2.22
Trichoderma species	2	1.94	4.44	3	2.16	6.67	2	3.64	4.44	0	0.00	0.00	0	0.00	0.00	7	1.84	3.11	0	0.00	0.00
Microsporum gypseum	1	0.97	2.22	2	1.44	4.44	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	3	0.79	1.33	0	0.00	0.00
Trichophyton terrestre	0	0.00	0.00	1	0.72	2.22	1	1.82	2.22	0	0.00	0.00	0	0.00	0.00	2	0.52	0.89	0	0.00	0.00
Mucor species	12	11.6	26.7	9	6.47	20.0	5	9.09	11.1	2	8.33	4.44	3	5.00	6.67	31	8.14	13.8	2	6.67	4.44
Alternaria species	7	6.80	15.5	6	4.32	13.3	3	5.45	6.67	1	4.17	2.22	2	3.33	4.44	19	4.99	8.44	2	6.67	4.44
Penicillium chrysogenum	2	1.94	4.44	4	2.88	8.89	1	1.82	2.22	0	0.00	0.00	2	3.33	4.44	9	2.36	4.00	1	3.33	2.22
Penicillium citrinum	3	2.91	6.67	3	2.16	6.67	0	0.00	0.00	1	4.17	2.22	3	5.00	6.67	10	2.62	4.44	0	0.00	0.00
Penicillium funiculosum	1	0.97	2.22	3	2.16	6.67	2	3.64	4.44	0	0.00	0.00	1	1.67	2.22	7	1.84	3.11	1	3.33	2.22
Penicillium species	3	2.91	6.67	7	5.03	15.5	3	5.45	6.67	2	8.33	4.44	3	5.00	6.67	18	4.72	8.00	2	6.67	4.44
Demataciae species	1	0.97	2.22	2	1.44	4.44	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	3	0.79	1.33	0	0.00	0.00
Candida albicans	2	1.94	4.44	6	4.32	13.3	3	5.45	6.67	1	4.17	2.22	3	5.00	6.67	15	3.94	6.67	2	6.67	4.44
Rhodotorula species	1	0.97	2.22	2	1.44	4.44	2	3.64	4.44	0	0.00	0.00	4	6.67	8.89	9	2.36	4.00	2	6.67	4.44
Yeast species	5	4.85	11.1	8	5.75	17.8	4	7.27	8.89	3	12.5	6.67	8	13.3	17.8	28	7.35	12.4	3	10.0	6.67
Sterile mycelium	1	0.97	2.22	2	1.44	4.44	1	1.82	2.22	0	0.00	0.00	0	0.00	0.00	4	1.05	1.78	1	3.33	2.22
Total	103			139			55			24			60			381			30		

Table (3) : Incidence percentages and frequency distribution of isolated moulds and yeasts in milking environment samples (Faculty of Vet. Medicine Hospital dairy farm, Assiut University).

) °ıÆ°# ,¹ǂ°–ˇ¹#	Examined samples of milking environment																				
	Air (9 samples)			Walls (9 samples)			Udder (9 samples)			Milker's hands (9 samples)			Equipments (9 samples)			Overall percentages (45 samples)			Milk (9 samples)		
	No. of Isolates	Inc %	Frq %	No. of Isolates	Inc %	Frq %	No. of Isolates	Inc %	Frq %	No. of Isolates	Inc %	Frq %	No. of Isolates	Inc %	Frq %	Total Number	T.I %	T.F %	No. of Isolates	Inc %	Frq %
Aspergillus flavus	1	3.57	11.1	2	4.44	22.2	2	6.90	22.2	0	0.0	0.0	1	4.76	11.1	6	4.17	13.3	0	0.0	0.0
Aspergillus fumigatus	2	7.14	22.2	3	6.67	33.3	1	3.45	11.1	1	4.76	11.1	1	4.76	11.1	8	5.55	17.8	1	5.0	11.1
Aspergillus niger	3	10.7	33.3	5	11.1	55.6	3	10.3	33.3	2	9.52	22.2	2	9.52	22.2	15	10.4	33.3	3	15.0	33.3
Aspergillus terreus	0	0.00	0.00	1	2.22	11.1	2	6.90	22.2	0	0.0	0.0	0	0.0	0.0	3	2.08	6.67	0	0.0	0.0
Aspergillus glaucus	1	3.57	11.1	1	2.22	11.1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	2	1.39	4.44	0	0.0	0.0
Aspergillus clavatus	1	3.57	11.1	1	2.22	11.1	0	0.0	0.0	0	0.0	0.0	1	4.76	11.1	3	2.08	6.67	0	0.0	0.0
Aspergillus candidum	0	0.00	0.00	0	0.00	0.00	1	3.45	11.1	0	0.0	0.0	0	0.0	0.0	1	0.69	2.22	0	0.0	0.0
Aspergillus sydowi	0	0.00	0.00	0	0.00	0.00	1	3.45	11.1	0	0.0	0.0	0	0.0	0.0	1	0.69	2.22	1	5.0	11.1
Aspergillus ustus	0	0.00	0.00	1	2.22	11.1	0	0.0	0.0	1	4.76	11.1	0	0.0	0.0	2	1.39	4.44	0	0.0	0.0
Aspergillus versicolor	1	3.57	11.1	3	6.67	33.3	1	3.45	11.1	1	4.76	11.1	1	4.76	11.1	7	4.86	15.6	1	5.0	11.1
Cladosporium species	2	7.14	22.2	2	4.44	22.2	0	0.0	0.0	1	4.76	11.1	0	0.0	0.0	5	3.47	11.1	2	10.0	22.2
Paeciliomyces voriotti	0	0.00	0.00	1	2.22	11.1	1	3.45	11.1	0	0.0	0.0	0	0.0	0.0	2	1.39	4.44	0	0.0	0.0
Fusarium oxysporum	1	3.57	11.1	1	2.22	11.1	0	0.0	0.0	2	9.52	22.2	0	0.0	0.0	4	2.78	8.89	0	0.0	0.0
Fusarium solani	0	0.00	0.00	0	0.00	0.00	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Scopulariopsis brevicaulis	1	3.57	11.1	2	4.44	22.2	1	3.45	11.1	1	4.76	11.1	1	4.76	11.1	6	4.17	13.3	2	10.0	22.2
Scopulariopsis candida	0	0.00	0.00	0	0.00	0.00	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Curvolaria species	2	7.14	22.2	1	2.22	11.1	2	6.90	22.2	2	9.52	22.2	2	9.52	22.2	9	6.25	20.0	1	5.0	11.1
Trichoderma species	0	0.00	0.00	1	2.22	11.1	1	3.45	11.1	0	0.0	0.0	0	0.0	0.0	2	1.39	4.44	0	0.0	0.0
Microsporum gypseum	0	0.00	0.00	0	0.00	0.00	1	3.45	11.1	0	0.0	0.0	0	0.0	0.0	1	0.69	2.22	0	0.0	0.0
Trichophyton terrestre	0	0.00	0.00	0	0.00	0.00	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Mucor species	3	10.7	33.3	3	6.67	33.3	2	6.90	22.2	2	9.52	22.2	2	9.52	22.2	12	8.33	26.7	2	10.0	22.2
Alternaria species	2	7.14	22.2	2	4.44	22.2	1	3.45	11.1	1	4.76	11.1	0	0.0	0.0	6	4.17	13.3	0	0.0	0.0
Penicillium chrysogenum	1	3.57	11.1	1	2.22	11.1	1	3.45	11.1	1	4.76	11.1	0	0.0	0.0	4	2.78	8.89	0	0.0	0.0
Penicillium citrinum	0	0.00	0.00	2	4.44	22.2	1	3.45	11.1	1	4.76	11.1	1	4.76	11.1	5	3.47	11.1	1	5.0	11.1
Penicillium funiculosum	0	0.00	0.00	0	0.00	0.00	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Penicillium species	2	7.14	22.2	3	6.67	33.3	2	6.90	22.2	2	9.52	22.2	3	14.3	33.3	12	8.33	26.7	2	10.0	22.2
Dematociae species	0	0.00	0.00	1	2.22	11.1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	0.69	2.22	0	0.0	0.0
Candida albicans	2	7.14	22.2	2	4.44	22.2	2	6.90	22.2	2	9.52	22.2	3	14.3	33.3	11	7.64	24.4	2	10.0	22.2
Rhodotorula species	0	0.00	0.00	1	2.22	11.1	1	3.45	11.1	0	0.0	0.0	1	4.76	11.1	3	2.08	6.67	0	0.0	0.0
Yeast species	2	7.14	22.2	3	6.67	33.3	2	6.90	22.2	1	4.76	11.1	2	9.52	22.2	10	6.94	22.2	2	10.0	22.2
Sterile mycelium	1	3.57	11.1	2	4.44	22.2	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	3	2.08	6.67	0	0.0	0.0
Total	28			45			29			21			21			144			20		

Table (4) : Incidence percentages and frequency distribution of isolated moulds and yeasts in milking environment samples (Secondary school of Agriculture dairy farm , Assiut City).

) °ıÆ°# ,¹ǂ°–ˇ¹#	Examined samples of milking environment																				
	Air (18 samples)			Walls (18 samples)			Udder (18 samples)			Teat cups (18 samples)			Equipments (18 samples)			Overall percentages (90 samples)			Milk (18 samples)		
	No. of Isolates	Inc %	Frq %	No. of Isolates	Inc %	Frq %	No. of Isolates	Inc %	Frq %	No. of Isolates	Inc %	Frq %	No. of Isolates	Inc %	Frq %	Total Number	T.I %	T.F %	No. of Isolates	Inc %	Frq %
Aspergillus flavus	1	3.03	5.55	3	5.17	16.7	2	5.71	11.1	0	0.0	0.0	1	3.45	5.55	7	3.61	7.78	0	0.0	0.0
Aspergillus fumigatus	2	6.06	11.1	4	6.90	22.2	2	5.71	11.1	1	2.56	5.55	2	6.90	11.1	11	5.67	12.2	1	4.76	5.55
Aspergillus niger	4	12.1	22.2	6	10.3	33.3	4	11.4	22.2	4	10.3	22.2	3	10.3	16.7	21	10.8	23.3	4	19.1	22.2
Aspergillus terreus	0	0.0	0.0	1	1.72	5.55	1	2.86	5.55	2	5.13	11.1	1	3.45	5.55	5	2.58	5.55	0	0.0	0.0
Aspergillus glaucus	1	3.03	5.55	0	0.0	0.0	0	0.0	0.0	2	5.13	11.1	0	0.0	0.0	3	1.55	3.33	0	0.0	0.0
Aspergillus clavatus	0	0.0	0.0	1	1.72	5.55	1	2.86	5.55	0	0.0	0.0	0	0.0	0.0	2	1.03	2.22	0	0.0	0.0
Aspergillus candidum	0	0.0	0.0	0	0.0	0.0	1	2.86	5.55	1	2.56	5.55	1	3.45	5.55	3	1.55	3.33	1	4.76	5.55
Aspergillus sydowi	1	3.03	5.55	2	3.45	11.1	0	0.0	0.0	0	0.0	0.0	1	3.45	5.55	4	2.06	4.44	0	0.0	0.0
Aspergillus ustus	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Aspergillus versicolor	1	3.03	5.55	2	3.45	11.1	2	5.71	11.1	2	5.13	11.1	1	3.45	5.55	8	4.12	8.88	1	4.76	5.55
Cladosporium species	2	6.06	11.1	2	3.45	11.1	3	8.57	16.7	3	7.69	16.7	1	3.45	5.55	11	5.67	12.2	1	4.76	5.55
Paeciliomyces voriotti	1	3.03	5.55	1	1.72	5.55	0	0.0	0.0	1	2.56	5.55	0	0.0	0.0	3	1.55	3.33	0	0.0	0.0
Fusarium oxysporum	1	3.03	5.55	2	3.45	11.1	1	2.86	5.55	1	2.56	5.55	0	0.0	0.0	5	2.58	5.55	1	4.76	5.55
Fusarium solani	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Scopulariopsis brevicaulis	2	6.06	11.1	2	3.45	11.1	2	5.71	11.1	2	5.13	11.1	1	3.45	5.55	9	4.64	10.0	1	4.76	5.55
Scopulariopsis candida	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Curvolaria species	1	3.03	5.55	3	5.17	16.7	2	5.71	11.1	2	5.13	11.1	1	3.45	5.55	9	4.64	10.0	1	4.76	5.55
Trichoderma species	0	0.0	0.0	1	1.72	5.55	1	2.86	5.55	0	0.0	0.0	0	0.0	0.0	2	1.03	2.22	0	0.0	0.0
Microsporum gypseum	0	0.0	0.0	1	1.72	5.55	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	0.51	1.11	0	0.0	0.0
Trichophyton terrestre	0	0.0	0.0	1	1.72	5.55	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	0.51	1.11	0	0.0	0.0
Mucor species	2	6.06	11.1	7	12.1	38.9	2	5.71	11.1	4	10.3	22.2	4	13.8	22.2	19	9.79	21.1	4	19.1	22.2
Alternaria species	1	3.03	5.55	2	3.45	11.1	0	0.0	0.0	1	2.56	5.55	1	3.45	5.55	5	2.58	5.55	0	0.0	0.0
Penicillium chrysogenum	2	6.06	11.1	2	3.45	11.1	1	2.86	5.55	1	2.56	5.55	0	0.0	0.0	6	3.09	6.67	1	4.76	5.55
Penicillium citrinum	0	0.0	0.0	1	1.72	5.55	1	2.86	5.55	1	2.56	5.55	0	0.0	0.0	3	1.55	3.33	0	0.0	0.0
Penicillium funiculosum	0	0.0	0.0	1	1.72	5.55	0	0.0	0.0	1	2.56	5.55	1	3.45	5.55	3	1.55	3.33	0	0.0	0.0
Penicillium species	4	12.1	22.2	3	5.17	16.7	2	5.71	11.1	3	7.69	16.7	2	6.90	11.1	14	7.22	15.6	2	9.52	11.1
Demataciae species	0	0.0	0.0	1	1.72	5.55	1	2.86	5.55	0	0.0	0.0	0	0.0	0.0	2	1.03	2.22	0	0.0	0.0
Candida albicans	2	6.06	11.1	3	5.17	16.7	3	8.57	16.7	3	7.69	16.7	5	17.2	27.8	16	8.25	17.8	2	9.52	11.1
Rhodotorula species	1	3.03	5.55	1	1.72	5.55	0	0.0	0.0	1	2.56	5.55	1	3.45	5.55	4	2.06	4.44	1	4.76	5.55
Yeast species	2	6.06	11.1	1	1.72	5.55	2	5.71	11.1	2	5.13	11.1	2	6.90	11.1	9	4.64	10.0	0	0.0	0.0
Sterile mycelium	2	6.06	11.1	4	6.90	22.2	1	2.86	5.55	1	2.56	5.55	0	0.0	0.0	8	4.12	8.88	0	0.0	0.0
Total	33			58			35			39			29			194			21		

DISCUSSION:

Dairy animal should have a comfortable environment that is hygienic and free from infection. The primary entry points of a pathogen into the milk are dairy animals, milk handlers, equipments and other contact environmental sources. Cross-contamination of the milk can occur from poor hygiene of milking environment in animal enclosures (Bringe, 1989 and McKinnon *et al.*, 1983). The present study is limited to suggesting the most possible sources of fungal contamination in milking environment as well as milk contamination and to explain how to prevent such contamination by application of restricted hygienic measures. The obtained results that illustrated in table (1) revealed a significant variation between the mean counts/1unit of the total moulds and yeasts of the examined air samples; inner wall surfaces; udder surfaces; milker's hands; teat cups; milk utensils and milk samples that collected randomly from all milking units of the experimented dairy farms in Assiut Province.

Air samples :

The mean counts of air samples/m^3 of total mould and yeast were $0.97 \times 10^4 \pm 0.30$; $3.52 \times 10^4 \pm 1.26$ and $5.96 \times 10^2 \pm 1.63$ in dairy farms of Fac. of Agriculture; Fac. of Vet. Medicine Hospital and Secondary school of Agriculture at Assiut Province respectively. These results were more or less similar with that obtained by Negulescu *et al.* (1961); Cannon (1970) and Amin (1980), as they recorded total fungal mean counts/m^3 of 2.5×10^3; 1.4×10^3 and 3.9×10^3 respectively. Moreover, the achieved mean counts of total moulds and yeasts/m^3 of all examined air samples (Table 1) were lower than detected by Kotimaa *et al.* (1978), who found fungal spore concentrations up to 10^8 cfu/m^3 in air samples of dairy farm building. Concerning the different species of the fungal isolates, *Aspergilli (A. flavus; A. fumigatus* and *A. niger); Cladosporium; Mucor; Penicillum; Candida albicans* and *Yeast species* were the most common detected fungi with variable incidence percentages from all examined air samples and represented by total of 164 fungal isolates (Tables 2, 3 & 4). Biological air contamination is considered one of the major sources of milk contamination with moulds and yeasts in dairy confinements (Nakae *et al.*, 1976).

Wall surfaces :

The mean counts of total mould and yeast on the inner wall surfaces/m^2 (Table 1) were $2.81 \times 10^4 \pm 1.64$; $1.80 \times 10^4 \pm 0.50$ and $1.44 \times 10^4 \pm 0.64$ in examined dairy farms in Fac. of Agriculture; Fac. of Vet. Medicine Hospital and Secondary school of Agriculture at Assiut Province respectively. Concerning the different species of the fungal isolates, *Aspergilli (A. flavus; A.fumigatus* and *A.niger); Cladosporium; Pacilomyces; Fusarium; Mucor; Alternaria; Penicillum; Candida albicans* and *Yeast species* were the most common detected fungi with variable incidence percentages from examined inner wall surfaces and represented by total of 242 fungal isolates (Tables 2, 3 & 4). One of the most milk and dairy regulations is that all surfaces should be free of indentations, flaking, pitting, cracks and finished with an impermeable, easily cleaned material to provide smooth clean uncluttered wall which will assist rapid and efficient cleaning (Reneau *et al.*, 1987; John, 2001). The sanitary control measures should be incorporated in any building design, so that a good hygienic standard can be easily maintained. The whole building should be cleaned and disinfected periodically (Galton & Merrill, 1987 & 1988).

Udder surfaces :

The mean counts of total mould and yeast on udder surfaces/m^2 (Table 1) were $2.09x10^4\pm 0.98$; $1.29x10^4\pm0.40$ and $5.64x10^2\pm1.60$ in examined dairy farms in Fac. of Agriculture; Fac. of Vet. Medicine Hospital and Secondary school of Agriculture at Assiut Province respectively. Concerning the different species of the fungal isolates, *Aspergilli (A. flavus; A. fumigatus; A. terreus* and *A. niger); Cladosporium; Mucor; Alternaria; Penicillum; Candida albicans* and *Yeast species* were the most common detected fungi with variable incidence percentages from examined udder surfaces and represented by total of 119 fungal isolates (Tables 2,3 & 4). McKinnon *et al.* (1983) concluded that, udder and teat surfaces represent important sources of milk contamination as was confirmed in a biological study of six parlour milked herds (Underwood *et al.*, 1974).

Milker's hands :

The mean counts of total mould and yeast on milker' hands/palm (Table 1) were $3.94 \times 10^2 \pm 1.38$ and $6.72x10\pm1.74$ in examined dairy farms in Fac. of Agriculture and Fac. of Vet. Medicine Hospital, Assiut University at Assiut Province respectively. Concerning the different species of the fungal isolates, *Aspergilli (A. fumigatus; A. terreus* and *A. niger); Cladosporium; Mucor; Penicillum; Candida albicans* and *Yeast species* were the most common detected fungi with variable incidence percentages from examined palms of milker's hands and represented by total of 45 fungal isolates (Tables 2&3). Milker's hands may become contaminated early in the milking routine and become a mean of transfer of pathogens to uninfected teats. Complete hand sanitation is nearly impossible under practical conditions. Milkers must wear sterile smooth rubber gloves and dip them in a sanitizing solution to reduce contamination during milking operation (Eberhart, 1987).

Teat cups :

The mean count of total mould and yeast on teat cups/m^2 (Table 1) was $1.84x10^2\pm0.29$ in case of the experimented dairy farm in the Secondary school of Agriculture at Assiut Province. Concerning the different species of the fungal isolates, *Aspergilli (A. fumigatus; A. niger and A. sydowi); Cladosporium; Paciliomyces; Mucor; Penicillum; Candida albicans; Rhodotorula* and *Yeast species* were the most common detected fungi with variable incidence percentages from inner surfaces of examined teat cups of milking machines and represented by total of 39 fungal isolates (Table 4). All containers including teat cups, rubber parts that come into contact with milk and vacuum hoses of milking machine must be thoroughly cleaned and soaked in an effective sanitizer for 2 to 3 hours before each use (John, 2001).

Milk utensils (equipments):

The mean counts of total mould and yeast on milk utensils/m^2 (Table 1) were $1.28x10^4 \pm 0.37$; $1.46x10^4\pm0.80$ and $0.81x10^3\pm0.24$ in examined dairy farms in Fac. of Agriculture; Fac. of Vet. Medicine Hospital and Secondary school of Agriculture at Assiut Province respectively. Concerning the different species of the fungal isolates, *Aspergilli (A. flavus; A.fumigatus; A.sydowi* and *A.niger); Cladosporium; Paciliomyces; Mucor; Curvolaria; Penicillum; Candida albicans; Rhodotorula* and *Yeast species* were the most common detected fungi with variable incidence percentages from examined milk equipments and represented by total of 110 fungal isolates (Tables 2, 3 & 4). Milk cannot be kept clean or free of

contamination if permitted to come into contact with unclean utensils or equipment. So the contact surfaces of all equipments and utensils used in handling, storage or transportation of milk should be cleaned and treated with an effective sanitizer before and after each usage (Galton & Merrill, 1987 & 1988) .

Milk samples :

The mean counts of total moulds and yeasts in milk samples/ml (Table 1) were 8.74x10±2.50; 2.6x10±0.78 and 5.3x10±1.47 in experimented dairy farms in Fac. of Agriculture; Fac. of Vet. Medicine Hospital and Secondary school of Agriculture at Assiut Province respectively. Concerning the different species of the fungal isolates, *Aspergilli (A. flavus; A. fumigatus* and *A. niger); Cladosporium; Mucor; Penicillum; Candida albicans; Rhodotorula* and *Yeast species* were the most common detected fungi with variable incidence percentages from examined milk samples and represented by total of 71 fungal isolates (Tables 2, 3 & 4).

The obtained results (Table 1) showed that, the mean counts of total mould and yeast / ml were lower than recorded by Nakae *et al.* (1976), who estimated a fungal plate count of 6.0 x10^3/ml in collected 41 raw milk samples from milking environment. Milk is an excellent medium for moulds and yeasts that are common contaminants. Their rapid growth, particularly at ambient temperature can cause marked deterioration and spoilage of milk. In addition loading of fungal spores may contaminate and deteriorate milk. *A. flavus* and *A. fumigatus* are capable of producing endotoxins and were reported in respiratory infections (Tilden *et al.*, 1961; Carter, 1979 and AL-Doory, 1980). Furthermore, various penicillia have also been reported to cause mycotoxicosis (Haul *et al.*, 1971).

The maximum of total fungal counts of the all examined milking environment samples was detected in examined air samples (6.0 x 10^4 / m^3) in Fac. of Vet. Medicine Hospital farm and in inner wall surfaces (6.0 x 10^4 / m^2) and (4.2x10^4/ m^2) from udder and teats surfaces swabs in Fac. of Agriculture farm, while the minimum of the total fungal count was estimated by (0.1 x 10 / ml) and(0.2x10/ml) which were observed in milk samples collected from Assiut Secondary School of Agriculture and Fac. of Vet. Medicine Hospital Farms respectively (Table 1). Moulds and yeasts are ubiquitous distribution and regarded more or less as a source of contamination of milking environment, which lead to milk spoilage and pass of inferior quality milk. Moreover, fungi act as polluting agents that may cause serious diseases or mycotoxicosis in animals (Carter, 1979 and AL-Doory, 1980).

The obtained results (Table 1) showed a positive correlation between the load of fungal contamination of milk and that of its surrounding environment which represented by the high counts of moulds and yeasts in examined milk samples and that of examined swabs of the inner wall surfaces; udder and teat surfaces and milker's hands.

Fungi may exert their pathogenic action either through invasion of tissues by infection, or as a source of toxic and allergizing toxins (Flannigan and Miller, 1994). The significance of isolated moulds and yeasts for the epidemiology of mycotic diseases such as moniliasis, aspergillosis and the possible intoxication " mycotoxicosis" especially through the presence of some toxin producing fungi such as *Aspergillus flavus* and *Aspergillus fumigatus* (Ainsworth & Austwick, 1973 and Buxton & Fraser, 1977). Several fungi of veterinary and medical importance such as *Penicillium spp., Mucor spp., Aspergillus fumigatus, Aspergillus*

niger **and** ***Aspergillus flavus*** **were isolated from the environment by Aleksandrov & Peev (1974); Dye & Vernon (1952); Gregory (1973); Mancianti & Papini (1996); Rajan & Siava (1972) and Youssef & El – Tarabishi (1966).**

Total of 790 mould and yeast isolates belonged to 14 genera were discovered in the present investigation as illustrated in tables (2; 3 & 4). The isolated moulds and yeasts from all examined milking environment and milk were mainly *Aspergillus fumigatus, Aspergillus flavus, Aspergillus terreus, Aspergillus niger ,Cladosporium species, Fusarium species, Mucor species, Penicillium species, Yeast species* and others with wide varieties of incidence and frequency percentages. They are consider as contaminants of the various dairy environments and some species are known to produce mycotoxins which deteriorate milk. The overall incidence percentages of most higher frequencies of the isolated moulds and yeasts from the all examined specimens of milking unit in case of Fac. of Agriculture dairy farm, were *Aspergillus flavus* (3.15%); *Aspergillus fumigatus* (6.82%); *Aspergillus niger* (12.3%); *Aspergillus sydowi* (2.36%); *Aspergillus versicolor* (2.36%); *Cladosporium spp.* (8.66%); *Paeciliomyces voriotti* (3.15%); Mucor spp. (2.36%); *Rhodotorula spp.* (2.36%) and *Yeast spp.* (7.35%) as demonstrated data in table (2). While, the overall incidence percentages of most higher frequencies of the isolated moulds and yeasts from the all examined specimens of milking unit in case of Fac. of Vet. Medicine Hospital dairy farm, were *Aspergillus flavus* (4.17%); *Aspergillus fumigatus* (5.55%); *Aspergillus niger* (10.4%); *Aspergillus terreus* (2.08%); *Aspergillus clavatus* (2.08%); *Aspergillus versicolor* (4.86%); *Cladosporium spp.* (3.47%); *Fusarium oxysporum* (2.78%); *Mucor spp.* (8.33%); *Alternaria spp.* (4.17%); *Penicillium spp.* (8.33%); *Candida albicans* (7.64%); *Rhodotorula spp.* (2.08%) and *Yeast spp.* (6.94%) as tabulated results in table (3). Moreover, the overall incidence percentages of most higher frequencies of the isolated moulds and yeasts from the all examined specimens of milking unit in case of Secondary School of Agriculture dairy farm, were *Aspergillus flavus* (3.61%); *Aspergillus fumigatus* (5.67%); *Aspergillus niger* (10.8%); *Aspergillus terreus* (2.58%); *Aspergillus sydowi* (2.06%); *Aspergillus versicolor* (4.12%); *Cladosporium spp.* (5.67 %); *Fusarium oxysporum* (2.58%); *Curvolaria spp.* (4.64%); *Mucor spp.* (9.79%); *Alternaria spp.* (2.58%); *Penicillium chrysogenum* (3.09%); *Penicillium spp.* (7.22%); *Candida albicans* (8.25%); *Rhodotorula spp.* (2.06%) and *Yeast spp.* (4.64%) as obtained results in table (4) .

The fungal distribution of such contamination in relation to animal environment was discussed by Nakae *et al.* (1976), who could isolate dominant groups of *Aspergillus* in frequencies of *A. niger* (18.3%); *A. flavus* (17.6%); *A. terreus* (16.0%) and *A. versicolor* (11.5%), and dominant series of *Penicillium* with frequencies of *P. decumbens* (16.0 %) and *P. restrictum* (7.6%) from milking environment. The incidence percentages of this data were more or less similar to the obtained results (Tables 2,3&4). Most of moulds and yeasts are potential pathogens and are incriminated in mycosis and a wide variety of animal diseases or mycotoxicoses. Moreover incidence of moulds and yeasts indicate poor hygiene of the milking environment in dairy units and pad handling of milk (Aleksandrov & Peev, 1974 Mossel, 1977 and Rieth, 1973). Furthermore, *Aspergillus species* are opportunistic pathogens cause adverse health effects and some varieties produce mycotoxins and aflatoxins, it has been known that toxicity syndromes resulting from toxic metabolites "mycotoxins "produced by some species of

Aspergilli like *Aspergillus flavus; Aspergillus fumigatus* and *Aspergillus terreus,* which may get interance into milk from the contaminated milking environment (Betina, 1998; Bullerman, 1986; Flannigan & Miller, 1994 and Thomas *et al*., 1979). Many of the recovered fungi and yeasts, Tables (2, 3& 4) have been beside their finding as inhabitant in the digestive tract of the worm-blooded animals as transient or permanent commensals, were also detected in different seats of the surrounding environment of animal buildings (Bonner & Fergus, 1959; Brsping, 1961 & 1963 a; Kaben & Preuss, 1967 b; Mehnert & Koch, 1963 and Schonborn, 1969).

The pathogenic fungi *Microsporum gypseum* and *Trichophyton terrestre were* detected in all of the examined milking environment samples with minor overall incidence percentages that fluctuated between 0.51% to 1.39% (Tables 2,3 & 4). But the both isolated fungi were failed to be detected in all tested milk samples that collected from experimented dairy farms. These fungi attack the skin causing ringworm in animals and of most common in cattle, and infection with these fungi is highly contagious and likely to spread to milking staff, also their spores survive in animal building for several years (Hillerton *et al*., 2001). *Microsporum gypsum and Keratinomyces* were isolated by Taylor *et al*. (1964), from environment of mammals in Egypt.

***Candida albicans; Rhodotorula species* and *Yeast species* were isolated from examined milk samples and other environmental specimens with variable frequency percentages (Tables 2,3&4). They are incriminated as etiological agents of moniliasis and allergic disorders which are of sporadic occurrence and of economic importance (AL-Doory, 1980).**

It is epidemiologically significant to consider that many of fungal spores play an important role in the transmission of some serious animal diseases responsible for health and economic losses among farm animals. Moulds, particularly those belonging to Aspergilli which have been incriminated as causative agents in many mycotic infections especially pulmonary aspergillosis, allergic alveolitis and pneumonitis (Clark, *et al*., 1983). Possibility of haemato-genous metastatic dissemination from lungs to other organs including heart, kidney, liver, brain and skin (Ainsworth & Austwick, 1973; Al-Doory, 1980; Buxton & Fraser, 1977 and Carter, 1979). Moreover, the fungal products of *Aspergilli* and *Penicillia* "mycotoxins" may reach milk secretion and pass for animal and human consumption (Haut *et al*., 1971; Krakowka *et al*., 1970; Jordan *et al*., 1971 and Kaplan, 1973). Furthermore, mycotoxic Fungi are considered as one of potentially major threat to animal and public health and continue to have an extensive impact on the welfare of domestic animals (Buxton & Fraser, 1977 and Thomas *et al*., 1977). The ultimate concern is that some of mycotoxins induced by some fungi are highly carcinogenic, mutagenic and tertogenic for animals and man (Bullerman, 1986; DeWaart, 1973 and Thomas *et al*., 1977).

In general, the animal environment is of equal importance both from the point of livestock welfare and of the maintenance of a high quality and safe milk yield. Under most farm conditions eliminating of infectious agents from the environment is difficult, but good management practice could aid in maintaining a level of environmental contamination less than critical (Boylan, 1982). The sanitary instructions should be strictly imposed together with educational programs in order to improve

hygiene condition of the milking environment as well as improve the hygienic quality of milk.

CONCLUSION:

From the epidemiological point of view, the great majority of the fungal isolates are considered as etiologically significant agents in the mycotic affections so, their presence in milking environment expose the dairy animal to infection and their milk production for contamination and spoilage. However, many species of fungi are considered as toxic producer leading to mycotoxicosis of dairy livestock .

The obtained results of the present work showed fluctuated levels of moulds and yeasts contamination in milking environment of the experimented dairy farms especially in samples that obtained from Fac. of Vet. Med. Hospital and Fac. of Agriculture, Assiut University. The high load of mould and yeast counts may be attributed to poor hygiene and bad sanitation of the investigated dairy units particularly in both farms of Vet. Med. Hospital and Fac. of Agriculture. Moreover, it was concluded from the interpretation of the achieved data that a positive correlation was observed between the load of fungal contamination of milk and contamination loads of its surrounding environment that represented by the high counts of moulds and yeasts in examined milk samples which were also corresponded by high mould and yeast counts of the same pattern in case of examined swabs of the inner wall surfaces; udder and teat surfaces and milker's hands.

To minimize the load of fungal contamination in milk and milking environment, strict hygienic measures should be applied. Induction of educational programs for workers with dairy herd environment. Eliminate or reduce environmental stress and avoiding animal overcrowdness, as well as minimize total population of microorganisms particularly in areas which come in contact with the udder. Use of a program for monitoring udder health status and application of good sanitation including teat dipping and extra equipment should be provided for milking of infected animals. In general, the golden rule of the milking environment improvement and to obtain milk of good keeping quality is that prevention is better than cure.

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الجوانب الصحية للملوثات الفطرية فى بيئة إنتاج اللبن لبعض مزارع الماشية الحلوب

مصطفى محمد أحمد ، سطوحى أحمد سطوحى

قسم صحة الحيوان – كلية الطب البيطرى – جامعة أسيوط

تلعب الفطريات والخمائر دوراً فعالاً وخطيراً فى تلوث منتج اللبن وعلى الأخص أثناء عملية الحلب، وذلك من مصادر التلوث المختلفة مثل الهواء ، ضرع وحلمات الحيوانات، أيدى الحلابين ، والأوانى المستخدمة وخلافه من البيئة المحيطة بالحيوانات الحلابة .وقد أجريت هذه الدراسة للوقوف على الحالة الصحية وعزل بعض الفطريات والخمائر من بيئة إنتاج اللبن لبعض المزارع الحلابة (مزرعة كلية الزراعة، مزرعة مستشفى كلية الطب البيطرى بجامعة أسيوط ومزرعة مدرسة الزراعة الثانوية بمدينة أسيوط) . استيفاءً لهذا الغرض تم تجميع وفحص إجمالى عدد ٤٣٢ عينة (٢ عينة هواء، ٧٢ مسحة من أسطح جدران المحلب الداخلى، ٧٢ مسحة من أسطح الضرع والحلمات، ٥٤ مسحة من أيدى الحلابين قبل الحلب مباشرة، ٧٢ مسحة من السطح الداخلى لأوانى الحليب ، ١٨ مسحة من السطح الداخلى لحلمات ماكينات الحلب الآلى، ٧٢ عينة لبن مأخوذة أثناء الحلب مباشرة) . وقد تركزت هذه الدراسة على إجراء العد الطبقى الكلى القياسى للفطريات والخمائر، كما تم عزل وتصنيف العديد من الفطريات والخمائر من البيئة المحيطة بالحيوانات الحلابة أثناء إجراء عملية الحليب، وكذلك من اللبن المنتج أثناء الحلب مباشرةً مع الإشارة للأهمية الصحية لأهم عترات الفطريات والخمائر المعزولة.

وقد أسفرت النتائج عن وجود متوسطات متفاوتة للعد الطبقى الكلى للفطريات والخمائر تراوحت بين حد أقصى قدره (٣,٥٢ ×١٠^{٤}±١,٢٦ لكل متر^{٣}) فى عينات الهواء ، و كحد أدنى قدرة (٢,٦×١٠±٠,٧٨ لكل ملى) فى عينات اللبن وذلك بحظيرة المستشفى البيطرى– جامعة أسيوط . وسجلت النتائج أعلى قيم للعد الطبقى الكلى للفطريات والخمائر قدره (٦ ×١٠ ^{٤} لكل متر^{٣}) فى عينات الهواء بحظيرة المستشفى البيطرى ، كذلك (٦×١٠^{٤} لكل متر^{٢}) من مسحات الجدران، (٤,٢×١٠^{٤} لكل متر^{٢}) من مسحات الضرع والحلمات فى مزرعة كلية الزراعة. كما تم تسجيل أقل أعداد للفطريات والخمائر قدره (٠,١ × ١٠ لكل ملى)، (٠,٢×١٠ لكل ملى) فى عينات اللبن المأخوذة من مزرعة مدرسة الزراعة وحظيرة المستشفى البيطرى على التوالى . وقد تم عزل العديد من الفطريات والخمائر المرضية والرمية بلغت فى مجملها ٧٩٠ عترة تتبع ١٣ جنس من الفطريات والخمائر المختلفة، وبنسب عزل متباينة فى إجمالى العينات المفحوصة من بيئة الماشية الحلابة للمزارع المختبرة وكذلك اللبن المنتج منها وكان من أهمها فطر الأسبرجيلس فلافس، الأسبرجيلس فيوميجاتس، الأسبرجيلس نيجر، الأسبرجيلس كلافاتس، الأسبرجيلس جلوكس، الأسبرجيلس كانديديم، الأسبرجيلس فرسيكلور، ميكروسبوريم جبسيم، تريكوفيتون تريستير، الكلادوسبوريم، الباسيليوميسس، الميوكر، الإرترناريا، البنسليوم، الكانديدا ألبيكان والرديتريولا والخمائر. هذا بالإضافة لبعض الفطريات والخمائر الأخرى بنسب عزل أقل . وقد توصلت هذه الدراسة لوجود ثمة علاقة ارتباط إيجابية بين الحالة الصحية لمنتج اللبن والحالة الصحية للضرع والحلمات وكذلك درجة نظافة أسطح الجدران الداخلية وأيدى الحلابين حيث لوحظ أن أعلى قيم للعد الطبقى الكلى القياسى للفطريات والخمائر فى عينات اللبن قابلها أيضا فى نفس الوقت أعلى قيم للعد الطبقى الكلى لكل من المسحات المختبرة لكل من أسطح الجدران الداخلية وكذلك الضرع والحلمات وأيدى الحلابين بالمثل . وبناءاً على ذلك فإنه يمكن القول بأن البيئة المحيطة بالحيوانات الحلابة تلعب دوراً هاماً وفعالاً فى تلوث منتج اللبن.

وقد تم التنويه عن بعض أهم الإجراءات والتوصيات الصحية والتى يجب وضعها فى الاعتبار والأخذ بها بصورة تطبيقية داخل مزارع الماشية وعلى الأخص المنتجة للألبان، وكذلك أهم الاحتياطات الممكن الاستعانة بها للحصول على منتج لبن نظيف

يخلو من مسببات الأمراض والملوثات المختلفة وعلى الأخص الفطريات والخمائر الممرضة أو الضارة لكل من الحيوان والإنسان حفاظاً على الصحة العامة والثروة الحيوانية بالبلاد.