УНИВЕРЗИТЕТ
ГОЦЕ ДЕЛЧЕВ

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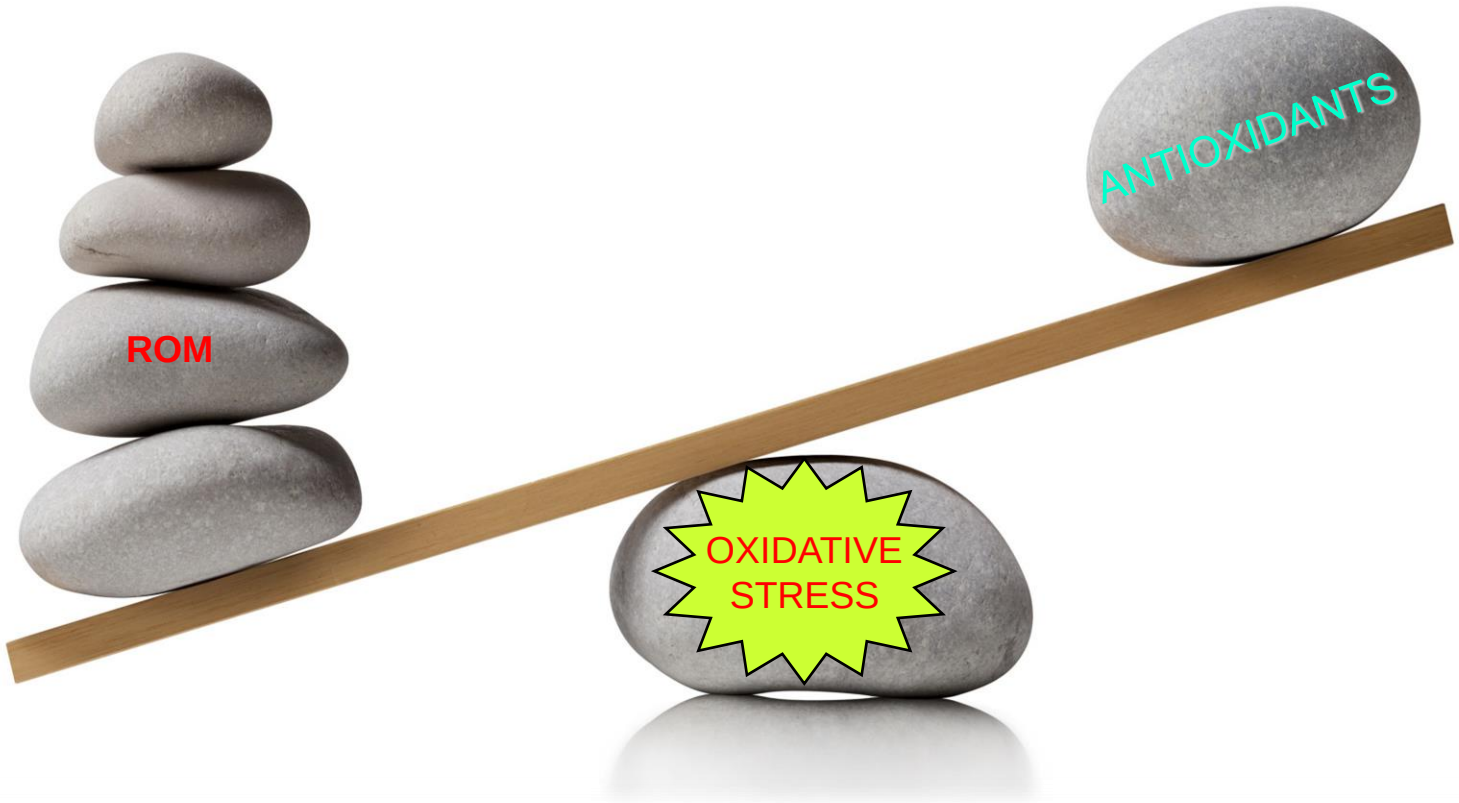
УНИВЕРЗИТЕТ
„ГОЦЕ ДЕЛЧЕВ“- ШТИП

MASTITIS MAKES CHANGES IN THE BLOOD ANTIOXIDANT ENZYME ACTIVITY DURING THE TRANSITION PERIOD OF DAIRY COWS: PART II

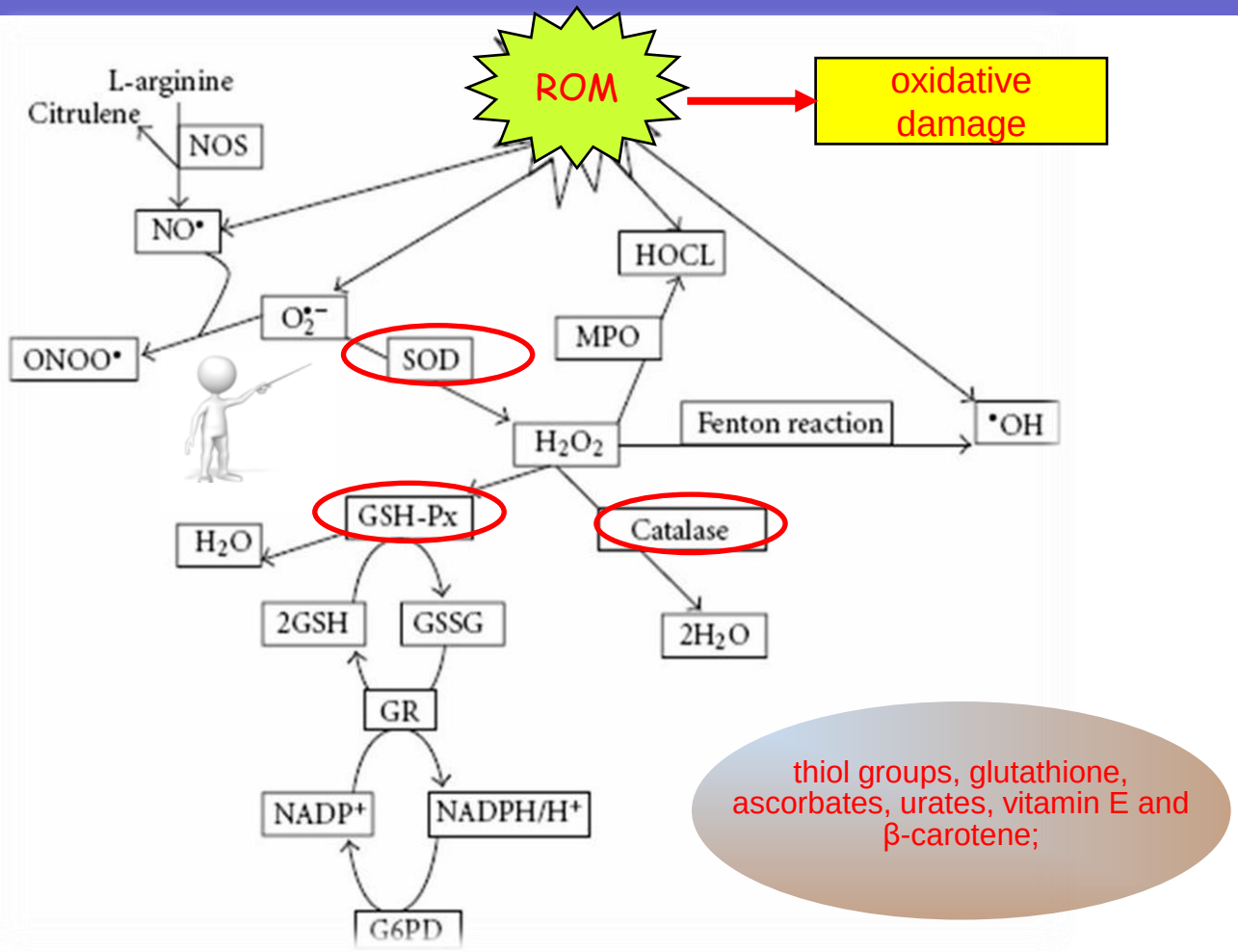
Dimitar Nakov, Aco Kuzelov, Slavča Hristov, Branislav Stanković, Jelena Miočinović, Marko Cincović

AGRORES 2024
XIII INTERNATIONAL SYMPOSIUM ON AGRICULTURAL SCIENCES
27-30 May 2024 Trebinje, Bosnia and Herzegovina

OXIDATIVE STRESS



ANTIOXIDANTS



thiol groups, glutathione, ascorbates, urates, vitamin E and β-carotene;

MASTITIS IN DAIRY COWS

Dairy herd health management;

Increased incidence of metabolic disorders and infectious diseases;

Mastitis in dairy cows;

Mastitis has a big influence on the productivity and utilization of dairy cows' genetic potential;

Annually 20 to 40% of dairy cows have expressed any form of mastitis during lactation.

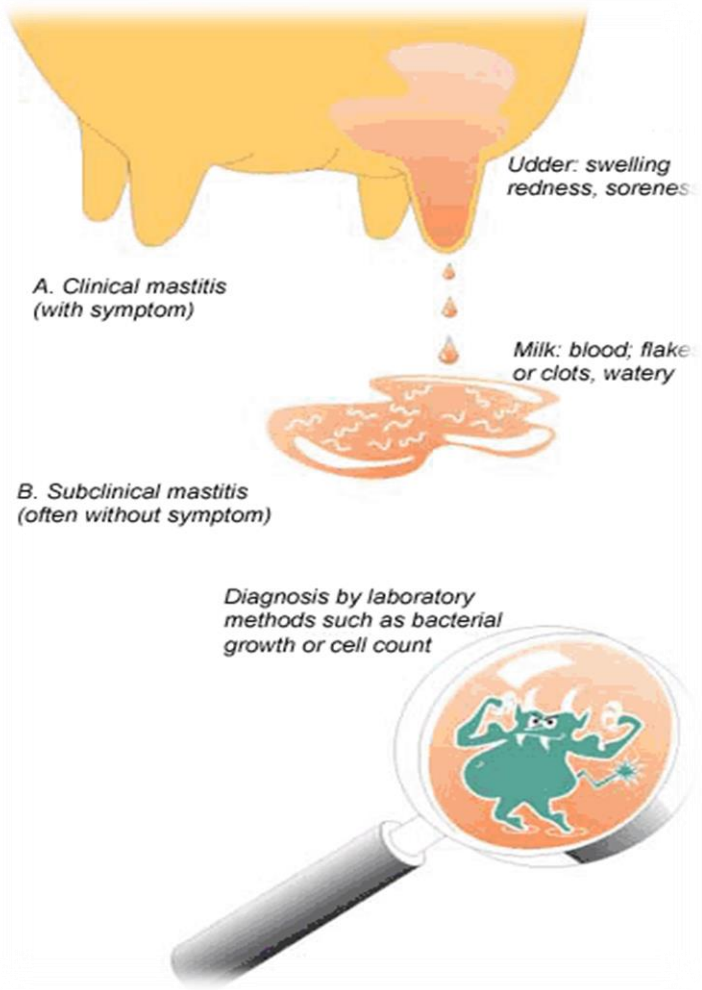
The high prevalence of mastitis in dairy herds makes considerable losses in milk production;

MASTITIS IN DAIRY COWS

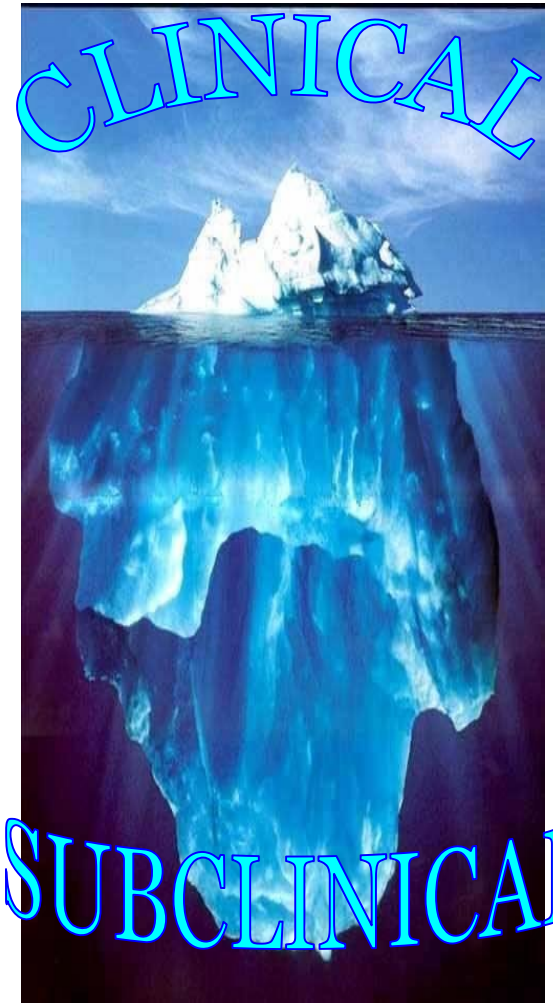
Mastitis remains one of the major disease and biggest epizootiology risk in dairy herds, causing profound economic losses to the entire milk production chain due to decreased milk production and milk quality;

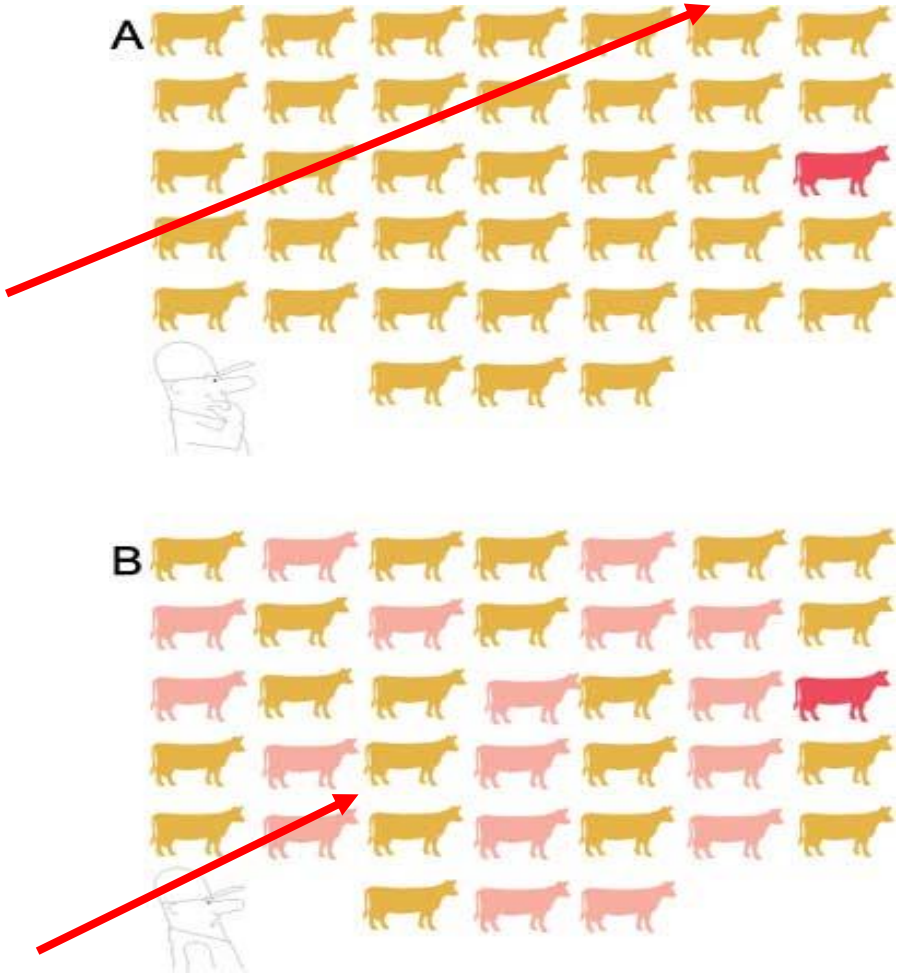
Mastitis is a complex disease which can be defined as an inflammatory reaction of the mammary gland;

- **Contagious and environmental;**
- **Clinical and sibclinical;**
- **Peracute, acute, subacute and chronical;**
- ***mastitis catarrhalis, mastitis parenchymatosa, mastitis interstitialis;***

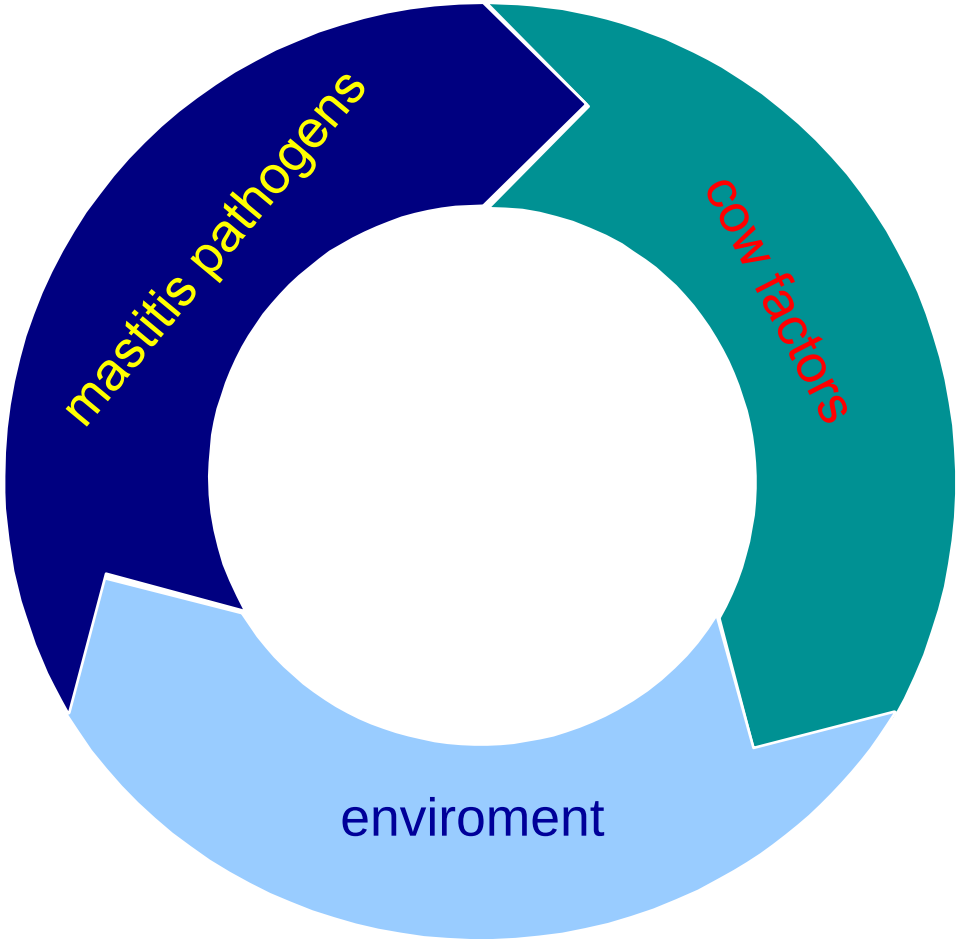


MASTITIS IN DAIRY COWS





MASTITIS IN DAIRY COWS



MASTITIS IN DAIRY COWS

CONTAGIOUS

- *Streptococcus agalactiae*
- *Staphylococcus aureus*
- *Mycoplasma bovis*

MINOR MASTITIS PATHOGENS

- *Staphylococcus hyicus*
- *Staphylococcus xylosus*
- *Corynebacterium bovis*
- *Pasteurella multocida*
- *Campylobacter jejuni*
- *Aspergillus niger*

ENVIRONMENTAL

- Environmental streptococci:
  - а) *Streptococcus uberis*
  - б) *Streptococcus dysgalactiae*
- Gram (-) bacteria:
  - а) *Escherichia coli*
  - б) *Klebsiella spp.*
  - в) *Citrobacter spp.*
  - г) *Corynebacterium pyogenes*
  - д) *Pseudomonas aeruginosa*
  - ѓ) *Enterococcus spp.*
  - е) *Proteus spp.*
- Coagulase (-) Staphylococcus


Original research paper

ПРОГРАМА ЗА КОНТРОЛА НА МАСТИТИСИТЕ ВО СТАДО СО МОЛЗНИ КРАВИ

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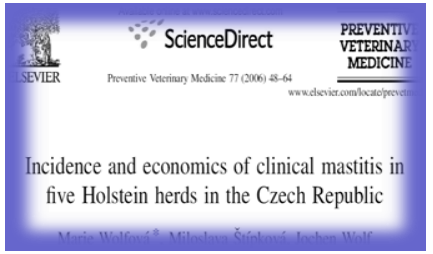
Бул. Александар Македонски бб, 1000 Скопје, Република Македонија,

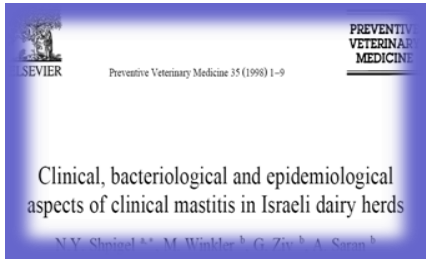

ScienceDirect

PREVENTIVE VETERINARY MEDICINE

Preventive Veterinary Medicine 77 (2006) 48–64

www.elsevier.com/locate/prevetmed

Incidence and economics of clinical mastitis in five Holstein herds in the Czech Republic


PREVENTIVE VETERINARY MEDICINE

Preventive Veterinary Medicine 35 (1998) 1–9

Clinical, bacteriological and epidemiological aspects of clinical mastitis in Israeli dairy herds

MATERIAL AND METHODS

AIM:

Evaluation of enzymatic antioxidant status in blood through the activity of superoxide dismutase (SOD) and glutathione peroxidase (GPX) collected from cows with mastitis in comparison with healthy cows

Correlation between antioxidant enzyme activity in blood and udder health disorders

MATERIAL AND METHODS

Two years longitudinal survey;

The samples of blood were collected during the morning milking;

GPX and SOD activity (mU/mg protein) was determined in blood serum using spectrophotometric assays;

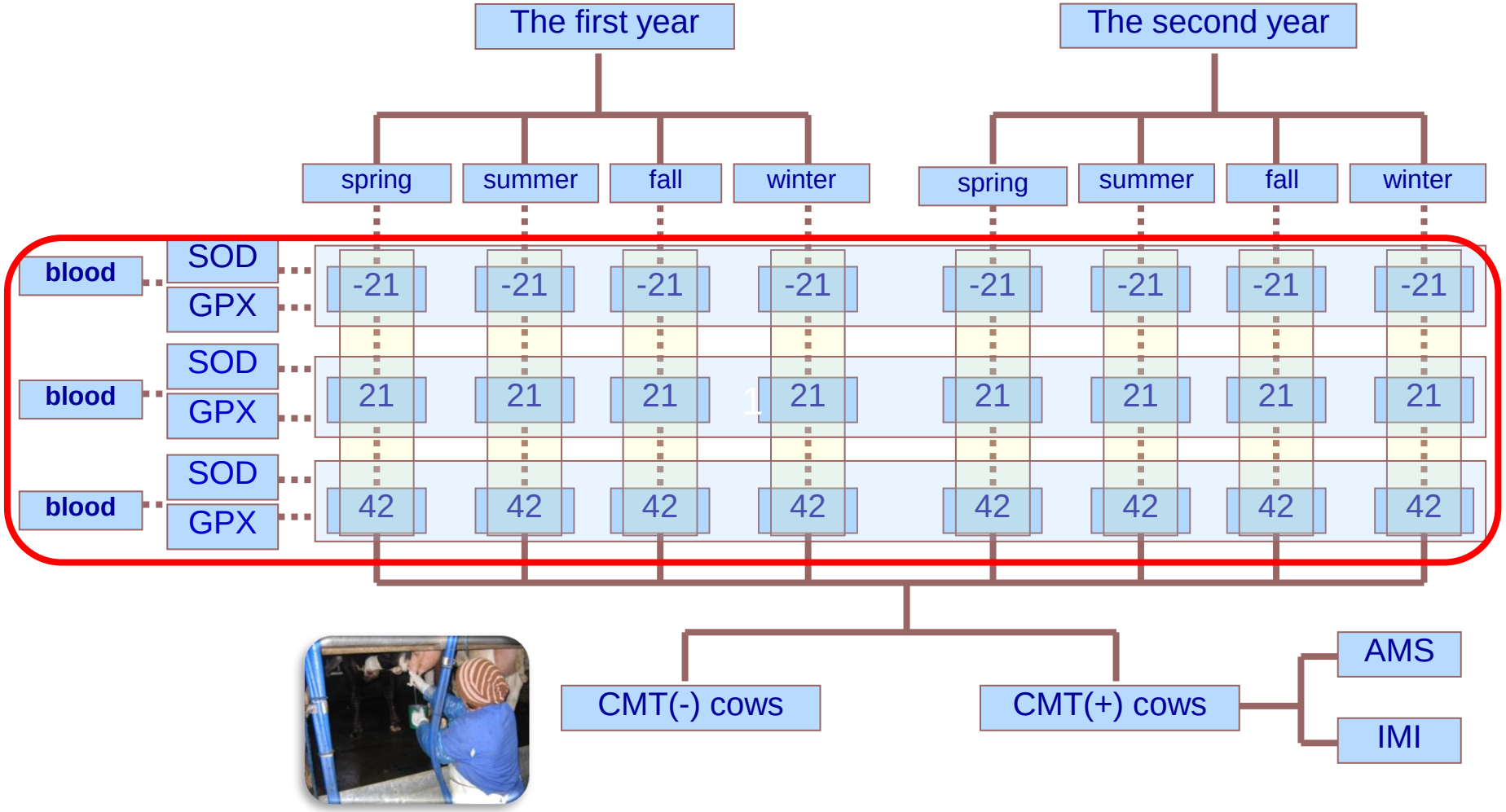
The animals were allocated into groups related to the season of calving and udder health status;

Transition period time points: 21 days before calving, period of early lactation from calving until 21st day in lactation and period from 22nd to 42nd day in lactation;

The screening of udder health was done daily on a quarter level using *CMT* and microbiological culturing

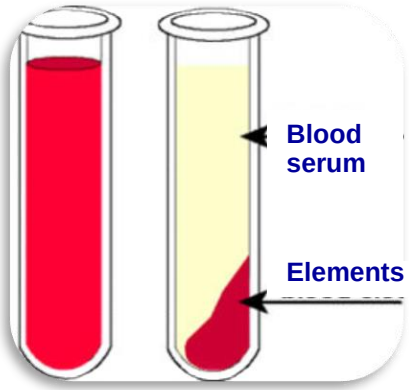
Multivariate GLM and Bonferroni significant difference test.

MATERIAL AND METHODS

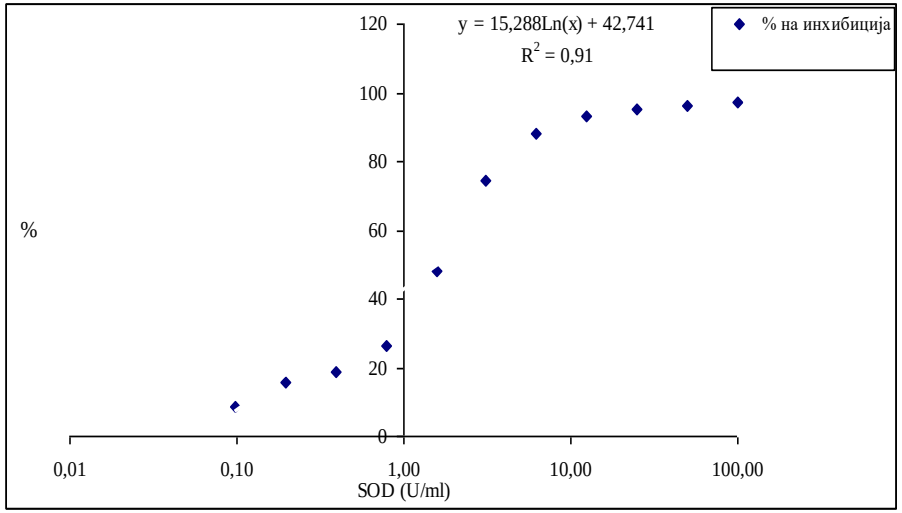


MATERIAL AND METHODS

BIOCHEMICAL ANALYSIS



Biological material - blood

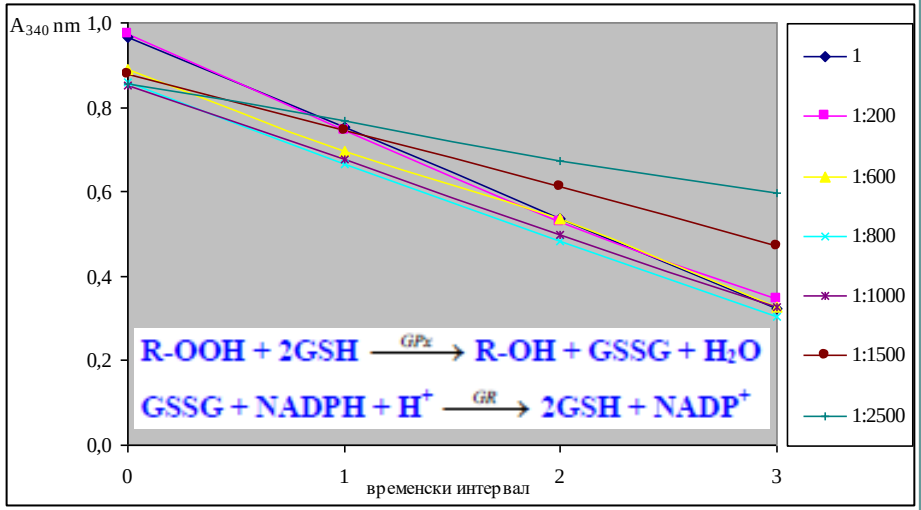


Activity of SOD

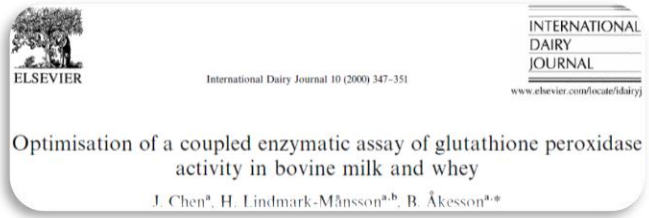

ELSEVIER

Mechanism of pyrogallol autoxidation and determination of superoxide dismutase enzyme activity

Ruomei Gao, Zhuobin Yuan, Zhiqiang Zhao, Xiurui Gao



Activity of GPX


ELSEVIER

International Dairy Journal 10 (2000) 347–351

INTERNATIONAL DAIRY JOURNAL

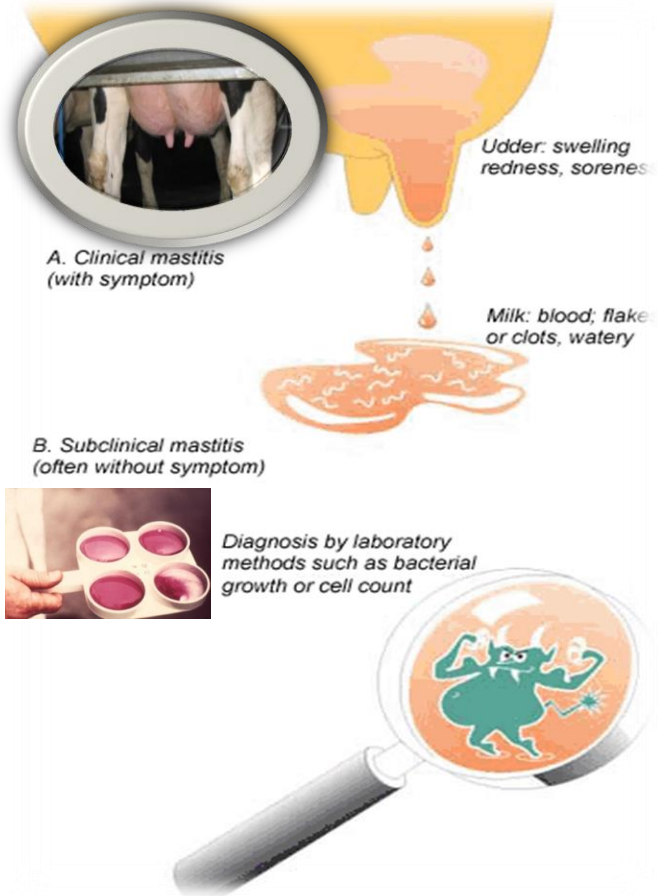
Optimisation of a coupled enzymatic assay of glutathione peroxidase activity in bovine milk and whey

J. Chen, H. Lindmark-Månsson, B. Åkesson

MATERIAL AND METHODS

FIELD ANALYSIS

- ✓ Clinical observation of udder quarters
- ✓ Clinical observation of milk for the presence of abnormalities
- ✓ Screening test: California Mastitis Test
- ✓ Milk samples for bacteriological culture



Based on udder health screening, the cows in the observed population were allocated into three groups: healthy cows, cows with persistent abnormal milk secretion and cows with intramammary infection;

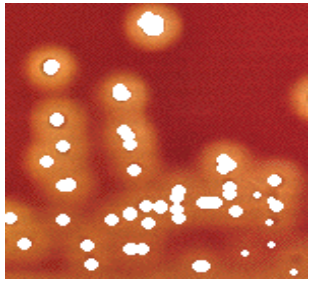
MATERIAL AND METHODS

MICROBIOLOGICAL ANALYSIS

Aseptical milk sampling

Antibacterial susceptibility

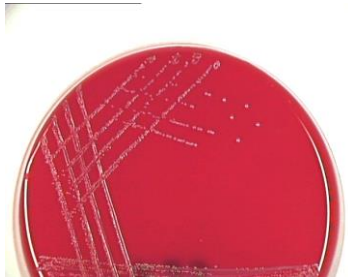
Standard microbiological procedure



Staphylococcus

Pseudomonas

Streptococcus



Enterococcus

Escherichia coli

RESULTS AND DISCUSSION

Average milk yield (kg) ± standard error of mean in the 1st, the 2nd and the 3rd TDM control from the beginning of lactation regarding the season of calving

Y_S	n	TDM_1 ($\bar{x} \pm S_{\bar{x}}$)	TDM_2 ($\bar{x} \pm S_{\bar{x}}$)	TDM_3 ($\bar{x} \pm S_{\bar{x}}$)
1_1[a]	24	29,79±1,704	28,82±1,266	28,50±1,018
1_2[a]	26	29,83±0,804	28,92±0,899	27,22±0,935
1_3[a]	18	24,07±1,100	24,90±1,151	23,48±0,756
1_4[a]	22	31,24±0,689	30,07±0,645	28,06±0,726
1[b]	**90**	**28,77±0,645**	**28,17±0,541**	**26,67±0,464**
2_1[a]	35	31,99±1,050	29,48±1,028	26,60±1,150
2_2[a]	20	21,01±1,503	25,02±1,528	23,39±2,071
2_3[a]	39	24,39±1,106	27,39±1,118	28,46±1,001
2_4[a]	27	35,47±1,806	32,95±1,592	33,52±1,392
2[b]	**121**	**28,78±0,847**	**29,14±0,693**	**28,84±0,719**
Total	**211**	**28.76±0.572**	**28.79±0.472**	**28.15±0.485**

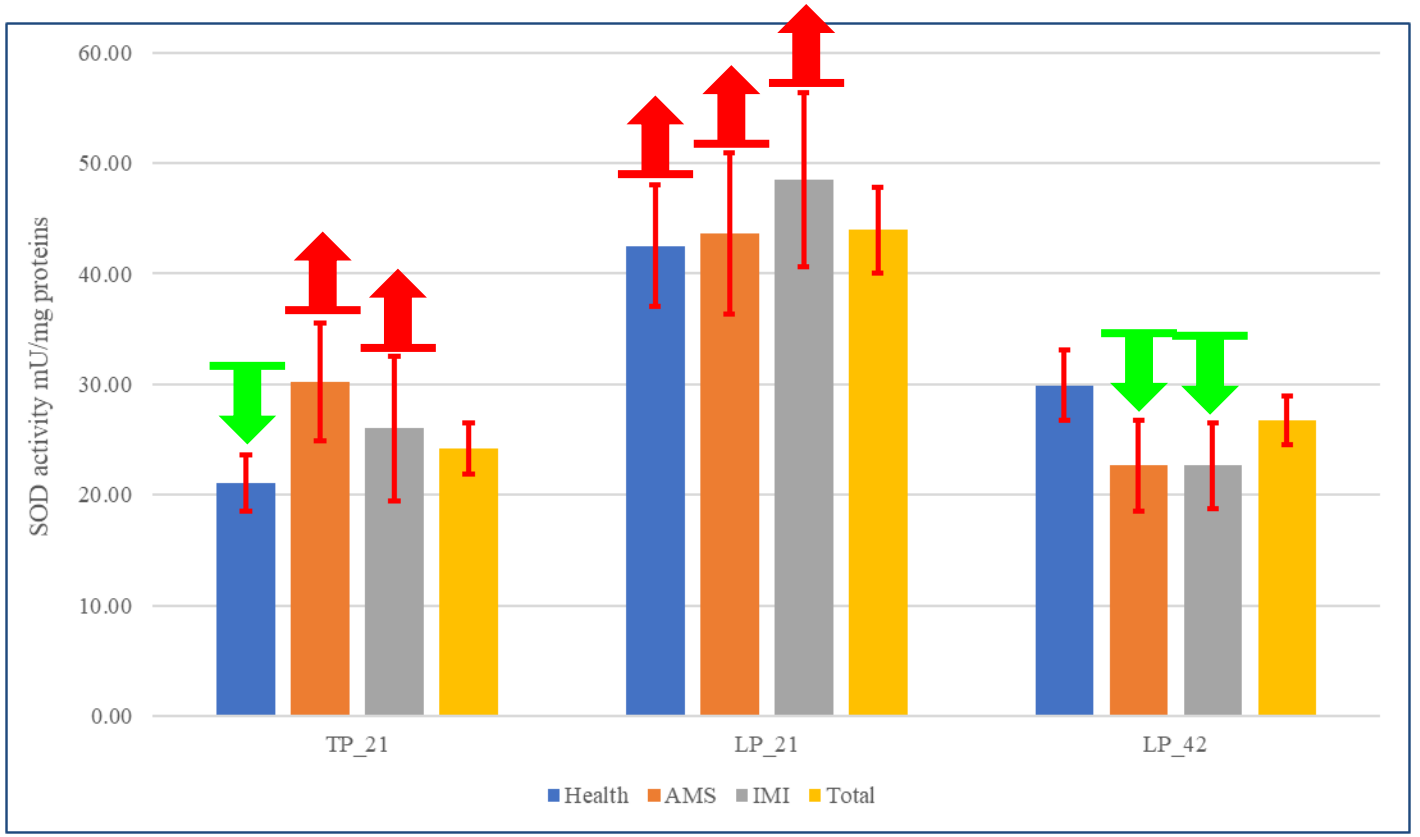
RESULTS AND DISCUSSION

The prevalence of udder health disorders in dairy cows

PP	Total	Healthy cows		AMS		IMI	
	n	n	%	n	%	n	%
LP_21	211	152	72,04	35	16.59	24	11.37
LP_42	211	153	72,51	30	14.22	28	13.27

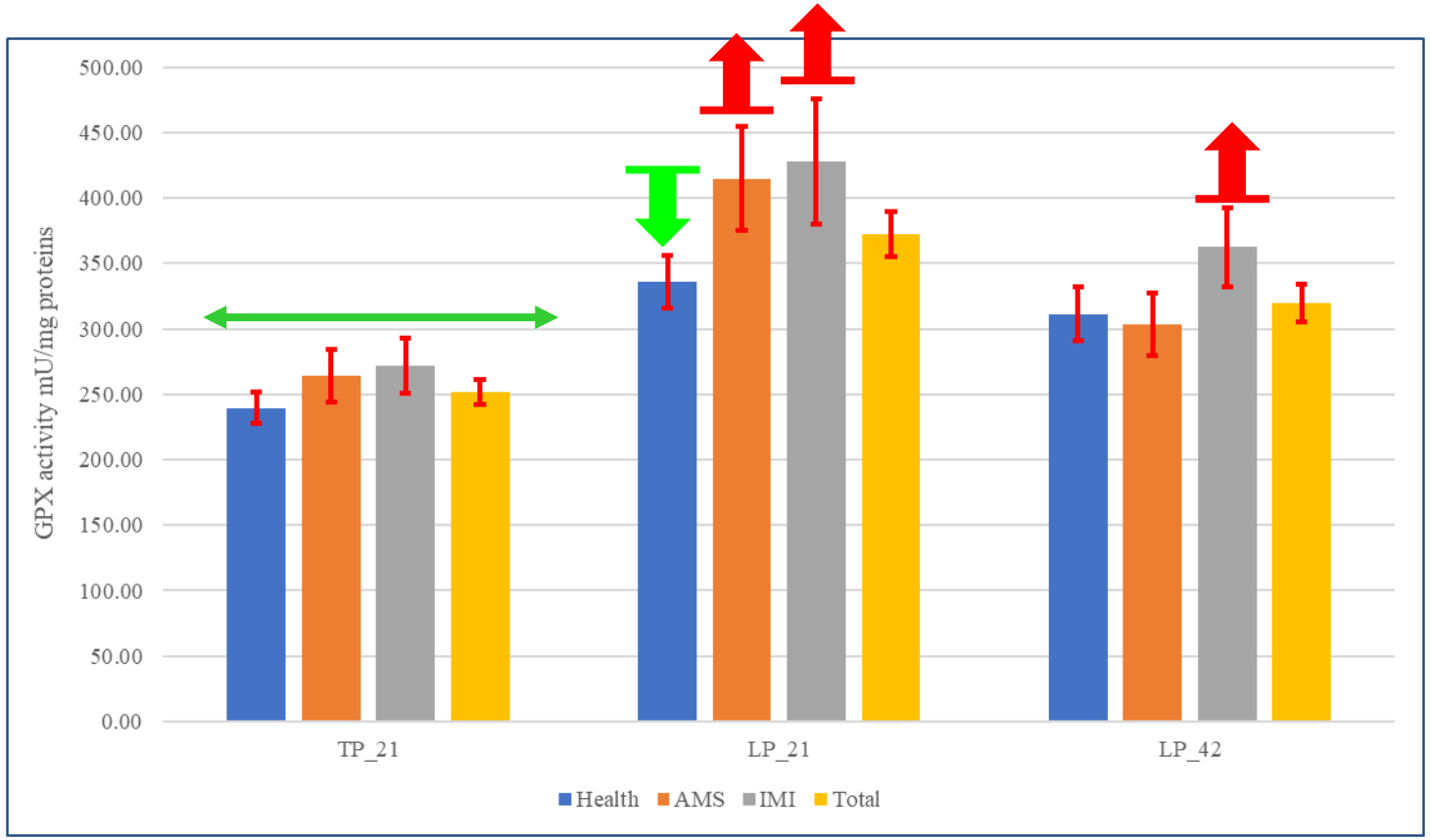
RESULTS AND DISCUSSION

The activity of SOD in blood serum



RESULTS AND DISCUSSION

The activity of GPX in blood serum



RESULTS AND DISCUSSION

Regression model for the influence of transition period and mastitis on SOD and GPX activity in blood serum of dairy cows

Fixed variable	df	SOD[a]	GPX[b]
Model[a,b]	5	136657.945***	12888995.85***
PP	2	24385.026***	605290.729***
Mastitis	2	366.940[NS]	136337.019*
Error	628	1773.466	41883.377
Total	633		

[a]R^2 = 0,375; [b]R^2 = 0,708

CONCLUSIONS

The prevalence of udder health disorders in the period of early lactation was relatively high: in LP_21 was 16.59 and 11.37 respectively for AMS and IMI, while in LP_42 was 14.22% and 13.27%, respectively for AMS and IMI.

The risk of manifesting oxidative stress in the transition period is high due to an imbalance in the activity of antioxidant enzymes

GLM revealed that udder disorders have a statistically significant influence on GPX activity in blood serum ($p<0.05$) but didn't have a statistically significant influence on SOD activity in blood serum. There was a low ($r = 0.141$), but statistically significant ($p<0.05$) positive correlation between SOD and GPX activity in blood serum.

Providing a balanced diet with adequate antioxidants and managing environmental stressors can help to reduce oxidative stress in the transition period and decrease the risk of mastitis in early lactation.

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THANKS FOR YOUR ATTENTION

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