PATENT CO.®

min-a-zel® Plus

ADVANCED
MYCOTOXIN CONTROL

mycotoxins

prevention is the only solution

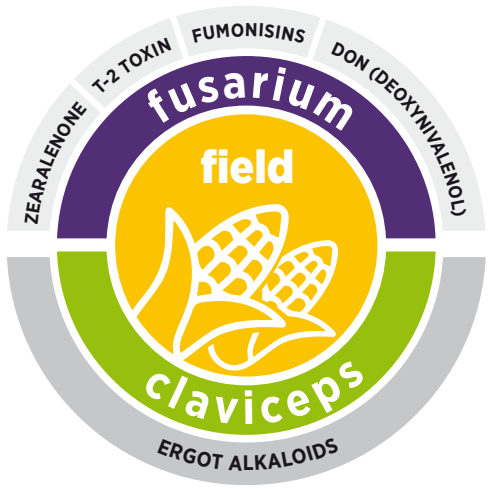
follow us on
LinkedIn, Facebook and Instagram

PATENT-CO.COM

ProviCo
RURAL

—mycotoxins

Mycotoxicosis is the group of diseases and disorders in animals and humans caused by toxic secondary metabolites (mycotoxins). Mycotoxins are produced by various fungi species. Mycotoxins can be divided into groups based on the source of origin:



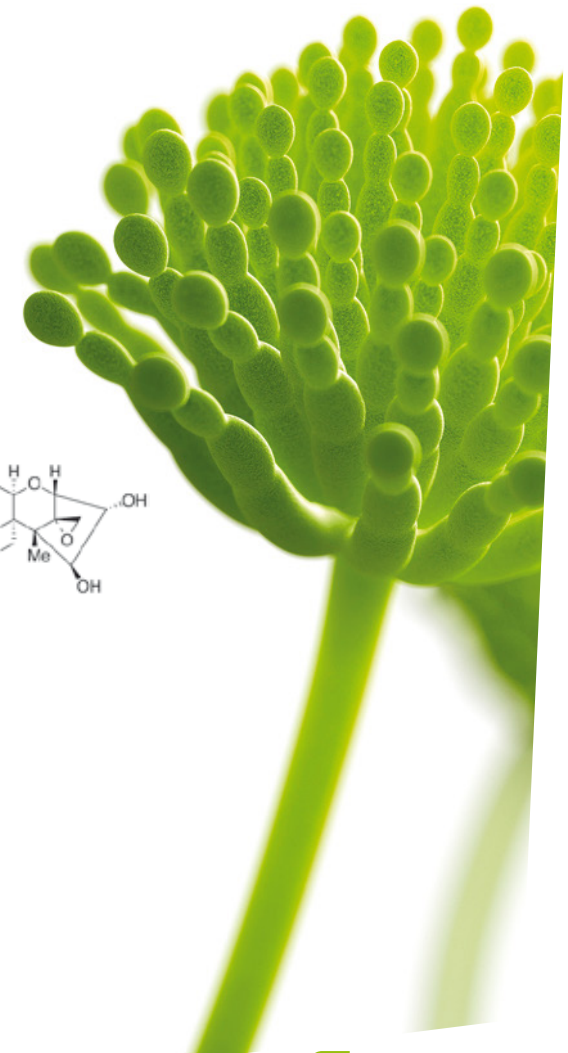
—flow

field / storage moulds >

mycotoxins > feed >

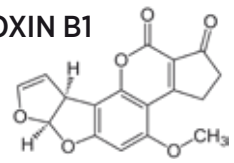
animals > animal products >

food

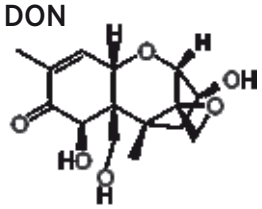


—most significant mycotoxins

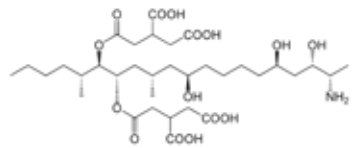
AFLATOXIN B1



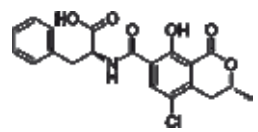
DON



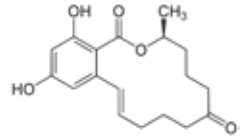
FUMONISIN B1



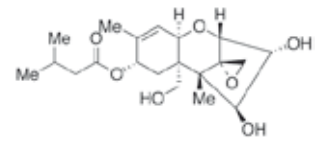
OCHRATOXIN A



ZEARALENONE



T-2 TOXIN



—presence

1

Presence of moulds doesn't necessarily imply presence of mycotoxins.

2

On the other hand, mycotoxins can be present even without visual presence of moulds.

3

At a certain stage in plant development, moulds can produce mycotoxins which persist even when the moulds are destroyed due to unfavourable conditions for development.

PATENT CO.

mycotoxicosis
clinical signs

Aflatoxin B1

Liver damage
Higher mortality
Abortions
Poor feed efficiency
Reduced feed intake
Carcinogenic effects

Liver damage
Decrease in body weight
Loss of appetite
CNS disorders (ducklings and turkeys)
Weakness of the legs and relaxed wings (chicks)
Blood coagulation disorders
B vitamins and amino acid metabolic disorder
Loss of immunity

Carcinogenic effects
Liver damage
Decreased milk production
Poor feed efficiency

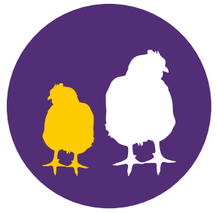
Zearalenone

Vulvovaginitis
Enlargement of the uterus
Sterility
Testicular atrophy in boars
Abortions
Diarrhoea
Body weight loss
Splay-leg in piglets

Less sensitive to Zearalenone

Decreased milk production
Infertility
Reproductive disorders
Reduced feed intake

mycotoxicosis
visual signs



Poor growth
- broiler -

Hepatic changes (pale)
- pig -

Vulvovaginitis
- sow -

Splay-leg
in piglets

+ synergistic effect of mycotoxins

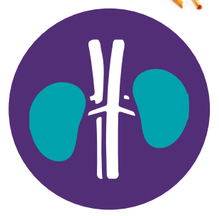
The combined negative effects of mycotoxins on productivity and health of animals appear to be greater than the sum of their individual effects

Ochratoxin A

Severe renal failure
Polyuria (increased urination)
Polydipsia (increased water intake)
Poor growth
Impaired FCR
Diarrhoea

Kidney damage
Polydipsia (increased water intake)
Poor egg-shell quality
Decreased egg production
Decreased feed intake
Immunosuppression

Less sensitive to Ochratoxin A



Kidney damage
– pig -

Blood in urine
- pig -

Trichothecenes

Haemorrhaging and enteritis
Reduced feed intake
Vomiting
Complete feed refusal
Immunosuppression

Oral and dermal lesions
Decrease in egg weight
Increased number of soft-shelled eggs
Immunosuppression
Decreased performance

Immunosuppression in calves
Decreased milk production
Reduced protein content in milk
Reduced feed intake

Mouth lesions
- duckling -

Mouth lesions
– broiler -

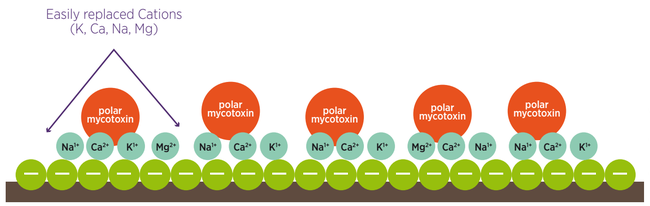
PATENT CO.

min-a-zel® Plus

—mycotoxin binder patented technology

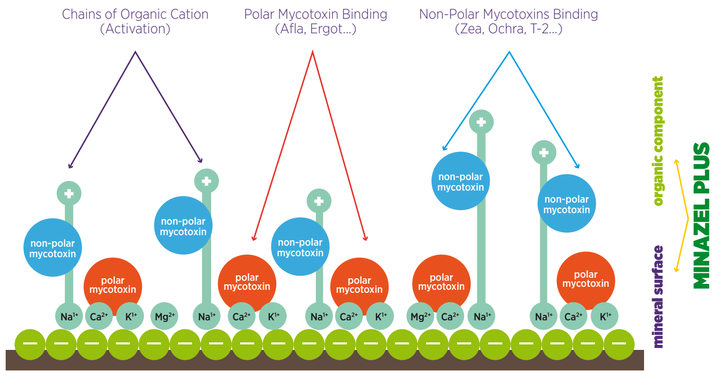
MINAZEL PLUS is a NEW COMPOUND created by patented technology, consisting of a:

- **Mineral component**
- **Organic component**



MINAZEL PLUS is the result of an ion-exchange reaction between inorganic cations on the mineral surface and organic cations.

The addition of organic cations serves to change the mineral surface. The result of this addition is not a simple mixture of mineral and organic phase, but a completely new compound, organo-mineral complex.



New active centres, which are formed on the mineral surface, ensure efficient binding (over 90%) of not only POLAR MYCOTOXINS (Aflatoxins, Ergot Alkaloids, etc.) but also of NON-POLAR MYCOTOXINS (Zearalenone, Ochratoxin A, T-2 toxin, etc.).

—dosage [kg/MT]

low contamination - preventive-

moderate to high contamination

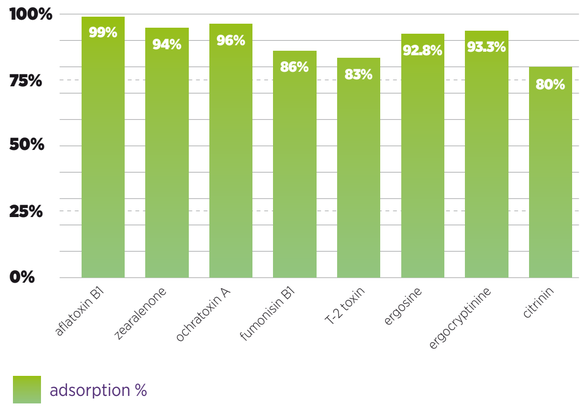
—product characteristics

Adsorption speed is a very important characteristics of mycotoxin binders.

Some mycotoxins are quickly adsorbed after oral intake. After 30 minutes, they can be found in the blood, and after 60 minutes in the liver.

1 **MINAZEL PLUS – adsorption speed:**

2 **MINAZEL PLUS - is highly effective (IN VITRO trial results):**



3 **MINAZEL PLUS - very selective, does not absorb nutrients (vitamins, oligoelements and amino acids)**

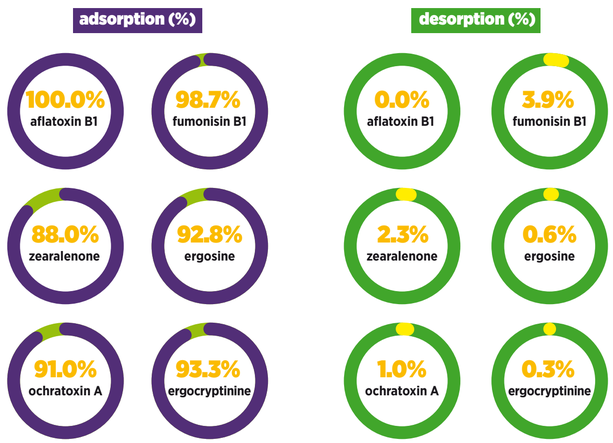
IN VITRO ADSORPTION/DESORPTION STUDIES

Materials and Methods – Adsorption

- Solution was adjusted to pH 3.0
- MINAZEL PLUS concentration 0.2%

Materials and Methods – Desorption

- Solution pH was adjusted to 6.5



—trials pigs

HAEMATOLOGICAL AND BIOCHEMICAL PARAMETERS OF WEANED PIGLETS FED WITH FEED MIXTURE CONTAMINATED BY ZEARALENONE WITH ADDITION OF MINAZEL PLUS

M. Speranda, etal; Acta Veterinaria (Belgrade), Vol. 56, No. 2-3,121-136,2006.

GROUP	body weight start		body weight final	
	AVERAGE VALUE	SD	AVERAGE VALUE	SD
C1	13.11	1.63	16.49	1.46
C2	13.68	1.55	16.93	1.76
E1	12.56	2.18	16.64	1.52
E2	12.71	2.05	15.70	2.60

(C1) without Zearalenone and without MINAZEL PLUS
(C2) without Zearalenone and with 2kg/MT of MINAZEL PLUS
(E1) with 3mg/kg of Zearalenone and with 2kg/MT of MINAZEL PLUS
(E2) with 3mg/kg of Zearalenone and without MINAZEL PLUS

HISTOPATOLOGICAL FINDINGS	GROUPS			
	C1	C2	E1	E2
Hepatitis interstitialis	0/0	0/0	1/5	4/5
Depletio lymphocitaria lienis et lymphonodulli	0/0	0/0	2/5	5/5
Many secondary oocytes	0/0	0/0	0/5	5/5
Hyperplasia glandularis uteri	0/0	0/0	1/5	5/5
Primary follicles on ovaries	2/5	2/5	3/5	5/5

CONCLUSION:

Piglets fed with Zearalenone contaminated feed (E2) have shown:

- Sex organ pathological changes (ovaries and uterus)
- Interstitial inflammation of liver
- Muscle inflammation
- Significantly lower Iron level in blood serum

Piglets fed with Zearalenone contaminated feed with addition of MINAZEL PLUS (E1) have shown:

- Negligible changes to sex organs
- No pathological hepatic and muscle changes
- No effect on iron level in blood serum

MINAZEL PLUS has successfully prevented the negative effects of Zearalenone!

RESULTS OF MINAZEL PLUS APPLICATION IN SOWS

Djordje Avakumovic, PhD, Prof. Vitomir Vidovic, PhD, Farm in Pancevo, Serbia

DESCRIPTION	TOTAL	
	T	C
Number of farrowings	48	50
Litters with vulvovaginitis	3	48
Litters with diarrhoea	4	35
Number of dead piglets	59	133
Mortality %	11.8	25.4

T-Trial group
Sow feed was contaminated with 1.7 mg/kg of Zearalenone with addition of 2kg/MT of MINAZEL PLUS

C-Control group
Sow feed was contaminated with 1.7 mg/kg of Zearalenone without addition of MINAZEL PLUS

CONCLUSION:

It can be concluded from the trials that the application of MINAZEL PLUS at a concentration of 0.2% in sow feed considerably reduced:

- Number of litters with vulvovaginitis
- Occurrence of diarrhoea in suckling piglets
- Mortality rate

—poultry and ruminant trials

RESEARCH ON THE PREVENTIVE EFFECTS OF MINAZEL PLUS ON AFLATOXIN B1 EXPOSED POULTRY

Radmila Resanovic, PhD, University of Belgrade, Faculty of Veterinary Medicine Belgrade 2000

TRIAL PHASE	GROUPS	
	C - body weight (g)	T - body weight (g)
Start	832.0	789.0
End	1836.5	1968.3

Aflatoxin B1 residues in liver			Aflatoxin B1 residues in meat		
Group	C	T	Group	C	T
Σ,%	100	0	Σ,%	70	0

C- Control group
Broilers were fed 0.1 mg/kg of Aflatoxin B1 per os, without addition of MINAZEL PLUS

T-Trial group
Broilers were fed 0.1 mg/kg of Aflatoxin B1 per os, with addition of 3 kg/MT of MINAZEL PLUS

CONCLUSION:

In broilers exposed to Aflatoxin B1 without MINAZEL PLUS (CONTROL GROUP)

- pathoanatomical and pathohistological changes were present in:
  - **Liver, kidneys, spleen, stomach, muscles**
- aflatoxin B1 residues were present in:
  - **Liver, kidneys, spleen, stomach, muscles**
- Negative effects on body weight and daily gain were noticed

In the trial group with the addition of MINAZEL PLUS no changes were seen in or residues found in broilers exposed to Aflatoxin B1! MINAZEL PLUS improved the body weight and daily gain parameters!

EFFECT OF MINAZEL PLUS IN DAIRY COWS

Srdan Nesic, Goran Grubid**, Milan Adamovic****
** PATENT CO. Belgrade, ** Faculty of Agriculture, University of Belgrade, ***ITNMS, Belgrade*

PARAMETER	TOTAL				
	A	B	C	D	E
Daily amount of Zearalenone per cow, mg	0.00	0.00	10.20	9.60	9.23
Amount of added MINAZEL PLUS in concentrate feed, %	0.0	0.2	0.0	0.2	0.5
Daily milk yield, kg	22.48	23.44	21.85	22.12	23.54
4% FCM, kg/day	21.18	21.09	19.17	19.86	20.72
Milk fat, %	3.32	3.33	3.18	3.32	3.2
Milk fat, kg	0.746	0.781	0.695	0.734	0.753
Proteins, %	3.09	3.08	3.01	3.11	2.97
Proteins, kg	0.695	0.722	0.658	0.688	0.699
Zearalenone concentration in milk, mg/kg	0.00	0.00	0.053	0.019	0.004
Zearalenone concentration in urine, mg/kg	0.00	0.00	0.112	0.14	0.000
Zearalenone concentration in faces, mg/kg	0.00	0.00	0.107	0.032	0.085

Group A - Feed without zearalenone contamination, without MINAZEL PLUS.
Group B - Feed without zearalenone contamination, with 0.2% MINAZEL PLUS.
Group C - Forage without zearalenone, concentrated feed with zearalenone contamination, Without MINAZEL PLUS.
Group D - Forage without zearalenone, concentrated feed with zearalenone contamination, with 0.2% MINAZEL PLUS.
Group E - Forage without zearalenone, concentrated feed with Zearalenone contamination, with 0.5% MINAZEL PLUS.

CONCLUSION:

The trial confirmed the positive effects of MINAZEL PLUS on daily milk yields and protein content, and that it considerably decreases the level of zearalenone in milk!

PATENT CO.

ABOUT US

PATENT CO. is a multinational company established in 1990 in the heart of Europe, in Serbia. Today we operate on 5 continents.

PATENT CO. strives to be an innovative and internationally-oriented company that is always one step ahead in introducing new technologies in animal nutrition.

RESEARCH AND DEVELOPMENT

Every year, **PATENT CO.** invests significant resources in research and development programs in laboratories, research centers and farms. These programs facilitates the development of new products, with a view to finding optimal animal feed production solutions.

QUALITY AND SAFETY

PATENT CO. invests in state-of-the-art equipment for the production of animal feed additives and premixtures, allowing us to achieve final products of a consistently high quality. This process ensures full traceability, from the reception of raw materials to delivery of the product to the customer.

ProviCo RURAL

PATENT CO.®

Vlade Ćetkovića 1a
24211 Mišićevo, Serbia
www.patent-co.com
export@patent-co.com