COMPREHENSIVE MULTI-ANALYTICAL SCREENING OF CONTAMINANTS IN RAW COW MILK USING THE INFINIPLEX FOR MILK ARRAY

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Introduction

Due to public health and industrial implications, the presence of food contaminants such as antibiotics, anti-inflammatories, anti-parasitics, corticosteroids, growth promoters, mycotoxins in milk is cause of concern. Monitoring their presence in milk is vitally important for consumer protection and regulatory limits have been set for the majority of these contaminants, therefore screening methods for their detection are beneficial in test settings.

Biochip Array Technology is a multi-analytical platform which allows the simultaneous detection of these contaminants from undivided samples of milk. The InfiniPlex for Milk Array is one such biochip array which detects 130 contaminants simultaneously.

Aim: to report the analytical application of the biochip array, InfiniPlex for Milk, that does not require sample preparation.

Methodology

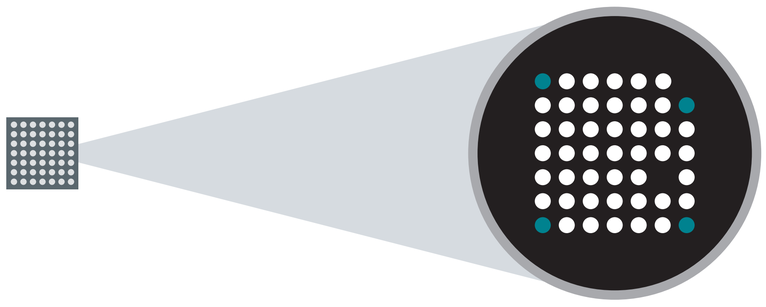
With the InfiniPlex for Milk Array, 43 simultaneous competitive chemiluminescent immunoassays, through 43 discrete test regions (DTRs) on the biochip surface, were employed.

The immunoassays were applied to the semi-automated biochip analyser, Evidence Investigator. Results were qualitative.

The neat raw cow milk sample volume added to each biochip was 25µl.

Infiniplex for Milk High Density Biochip Array

Precision



Example :
InfiniPlex for Milk (EV4076)

43 discrete test regions
on each biochip

Biochip Array Layout

REFERENCE QC	TOBRAMYCIN	BAQUILOPRIM	5-HYDROXY FLUNIXIN	VIRGINIAMYCIN	RIFAXIMIN	ORIENTATION QC
PIRLIMYCIN	CHLORMADINONE	SPECTINOMYCIN	QUINOLONES	APRAMYCIN	PHENYLBUTAZONE	CORRECTION QC
RACTOPAMINE	METAMIZOLE	SULPHONAMIDES	STREPTOMYCIN	SULPHAGUANIDINE	ERYTHROMYCIN	SULPHAPYRIDINE
TETRACYCLINES	LINCOMYCIN	TYLOSIN	CORTICOSTEROIDS	NEOMYCIN	PREDNISOLONE	BETA-LACTAMS
TRIMETHOPRIM	AMPHENICOLS	SULPHAMETHAZINE	MELOXICAM	TOLFENAMIC ACID		HYGROMYCIN B
SPIRAMYCIN	NOVOBIOCIN	CEFUROXIME	BACITRACIN	DAPSONE	CEPHALEXIN	MELAMINE
CORRECTION QC	POLYMIXINS	KANAMYCIN	NITROXYNIL	AFLATOXIN M1	GENTAMICIN	CORRECTION QC

This biochip array has the capability to test for 130 contaminants.

Specific Assay Generic Assay (ie. detects 2 or more residues)

Results

InfiniPlex for Milk biochip array detects 130 contaminants, including marker residues and metabolites.

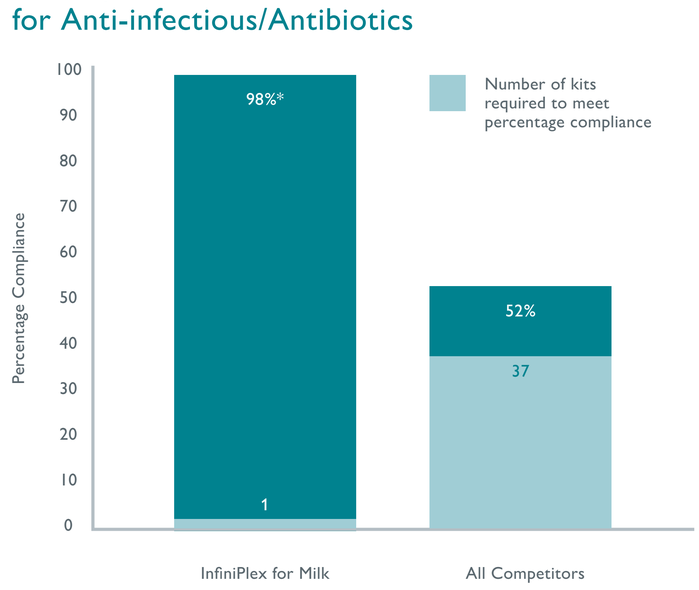
InfiniPlex Decision Levels

Assay (DTR)	Drug Residue	Decision Level (ppb)
Quinolones	Enrofloxacin	12.50
	Ciprofloxacin	13.80
	Danofloxacin	11.30
	Difloxacin	20.00
	Marbofloxacin	22.50
	Oxolinic Acid	15.00
	Flumequine	22.50
Beta-Lactams	Benzylpenicillin	0.88
	Ampicillin	2.00
	Dicloxacillin	2.00
	Amoxicillin	2.40
	Cloxacillin	1.30
	Oxacillin	1.40
	Nafcillin	3.00
	Cefalonium	0.35
	Cefoperazone	3.80
	Cefapirin	5.00
	Cefquinome	6.30
	Ceftiofur	25.00
	Cefacetril	10.00
	Cefazolin	18.00
	Penicillin V	0.15
Cephalexin	Cephalexin	23.00
Erythromycin	Erythromycin	2.50
	Gamithromycin	32.00
	Tulathromycin	50.00
	Oleandomycin	60.00
Spiramycin	Spiramycin	1.00
	Neospiramycin	16.00
Tylosin	Tylosin A	7.50
	Tilmicosin	50.00
Lincomycin	Lincomycin	6.50
Pirlimycin	Pirlimycin	11.00
Streptomycin	Streptomycin	32.00
	Dihydrostreptomycin	20.00
Gentamicin	Gentamicin	22.00
Neomycin	Neomycin	9.00
	Paromomycin	3.00
	Framycetin	7.50
Kanamycin	Kanamycin A	4.00
Spectinomycin	Spectinomycin	3.00
Amphenicols	Chloramphenicol	0.22
	Florfenicol	0.40
	Thiamphenicol	1.60
Trimethroprim	Trimethoprim	13.00
Baquiloprim	Baquiloprim	3.00
Rifaximin	Rifaximin	1.00
Apramycin	Apramycin	6.00
Virginiamycin	Virginiamycin M1	0.75
Tobramycin	Tobramycin	7.00

Assay (DTR)	Drug Residue	Decision Level (ppb)
Tetracyclines	Chlortetracycline	16.30
	Tetracycline	10.00
	Oxytetracycline	18.80
	Doxycycline	50.00
Polymixins	Colistin	1.30
	Polymixin B	0.50
Bacitracin	Bacitracin	2.00
Cefuroxime	Cefuroxime	8.50
5-Hydroxy Flunixin	5-OH Flunixin	0.25
	Flunixin	0.36
Meloxicam	Meloxicam	6.00
Metamizole	4-methylamino antipyrine	42.00
Tolfenamic Acid	Tolfenamic Acid	1.60
Phenylbutazone	Phenylbutazone	1.25
	Oxyphenbutazone	1.50
Chlormadinone	Chlormadinone	1.20
Methylprednisolone	Methylprednisolone	0.40
	Prednisolone	1.40
Sulphaguanidine	Sulphaguanidine	50.00
Sulphamethazine	Sulphamethazine	1.20
	Sulphamerazine	25.00
	Sulphamoxol	174.00
Sulphapyridine	Sulphapyridine	0.90
	Sulphaethoxypyridazine	30.00
	Sulphamethoxypyridazine	30.00
	Sulphamoxol	28.50
	Sulphasalazine	1.20
	Sulphanitran	60.00
	Sulphathiazole	50.00
	Sulphamonomethoxine	80.00
Dapsone	Dapsone	1.70
	Sulphathiazole	70.00
	Sulphadoxine	100.00
	Sulphadimethoxine	7.00
	Sulphanitran	210.00
	Sulphapyridine	200.00
	Sulphaquinoxaline	5.00
	Sulphamerazine	25.00
	Sulphamonomethoxine	48.00
	Sulphadiazine	60.00
	Sulphamethoxypyridazine	85.00
	Sulphamethizole	50.00
	Sulphameter	10.00
	Sulphaisomidine	16.00
	Sulphamethazine	30.00
	Sulphaethoxypyridazine	120.00
	Sulphamethoxazole	100.00
Melamine	Melamine	200.00
Nitroxynil	Nitroxynil	1.50
Aflatoxin M1	Aflatoxin M1	0.038

Assay (DTR)	Drug Residue	Decision Level (ppb)
Novobiocin	Novobiocin	12.50
Corticosteroids	Dexamethasone	0.20
	Betamethasone	2.50
Hygromycin B	Hygromycin B	7.5
Sulphonamides	Sulphathiazole	24.00
	Sulphaquinoxaline	4.50
	Sulphadimethoxine	1.60
	Sulphacetamide	2.40
	Sulphadoxine	2.50
	Sulphabenzamide	0.56
	Sulphamethoxazole	1.60
	Sulphamonomethoxine	0.76
	Sulphachlorpyridazine	1.80
	Sulphadiazine	14.00
	Sulphamethoxypyridazine	40.00
	Sulphisoxazole	0.75
	Sulphamerazine	22.00
	Sulphamethizole	6.00
	Sulphameter	6.00
	Sulphamoxol	88.00
	Sulphanitran	46.00
	Sulphaphenazole	4.60
	Sulphatroxazole	0.75
	Sulphisomidine	13.00
	Sulphaethoxypyridazine	30.00
	Sulphapyridine	110.00
	Sulphadozine	4.00
Ractopamine	Ractopamine	0.32

% compliance with EU Annex 37/2010 for Anti-infectious/Antibiotics



*Clavulanic acid is detected indirectly as this residue is only used in combination with Amoxacillin.

Conclusion

This analytical application indicates that by using InfiniPlex for Milk Array the screening of contaminants in milk samples is maximized (130 contaminants detected from each undivided samples) and simplified (no sample preparation is required).

InfiniPlex for Milk Array greatly assists in the monitoring of raw milk compliance to a comprehensive variety of contaminants.

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