Food fraud prevention

Can science help us avoid a crisis?

Prof. Robert Renaville

Gembloux Agro-BioTech, ULg
CEO of Progenus s.a.

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Why should we test for species authenticity?

NOW

?

OR

BEFORE

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3 Questions ...

Can I control my suppliers?

Can I check the cleaning of my production chain from previous production lots?

As a consumer, can I trust what I eat?

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… 2 technical answers

First step : DNA detection by qPCR methods

Is there any undesired species in my food?
Ex : horse in beef hamburger

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… 2 technical answers

Second step : quantification

Do I fit with the legislation : <1% or >1%?
Is the minced meat supplied, really 40 pig/60 beef ?

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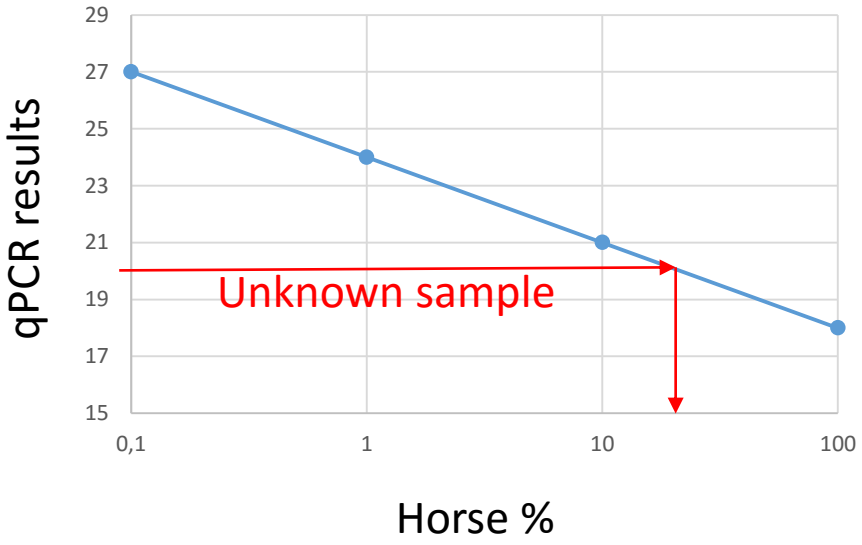
4 quantification approaches

Dilution curve → EU method → ∑ species → Easyfast™ test

Dilution curve

Principle : DNA is extracted from meat and serially diluted in buffer. Horse percentage in the unknown sample is extrapolated from this standard curve



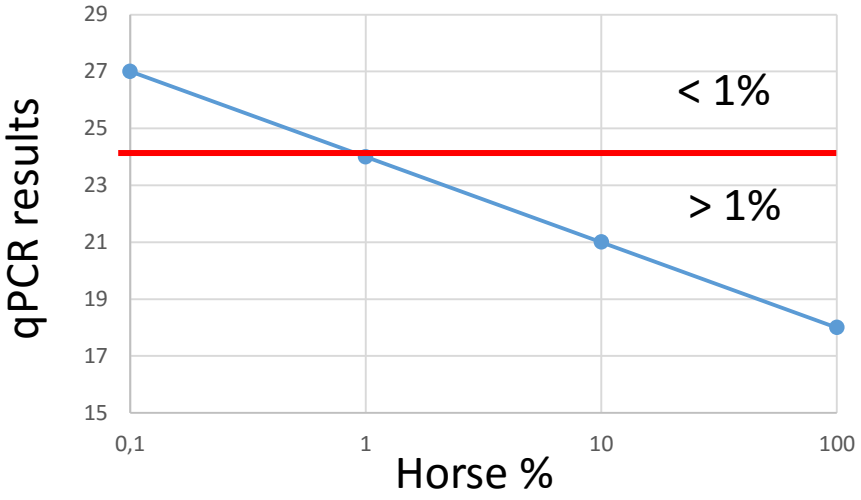
No account of matrix effect

4 quantification approaches

Dilution curve → **EU method** → ∑ species → Easyfast™ test

EU method

Principle : DNA is extracted from beef meat with 1% of horse meat, unknown samples are compared to this reference



No account of technological process (heat, …)
No real quantification

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4 quantification approaches

Dilution curve → EU method → ∑ species → Easyfast™ test

Sum of species method

Principle : values for 7 species are added which is equaled to 100%

species	PCR results	Percentage
Beef	50000	25 %
Horse	2300	1%
Pig	87000	43%
Goat	56987	28%
Sheep	123	0,06%
Chicken	0	0%
Turkey	6897	3%

∑

No account of the different efficiency of the 7 analysis
No account of other species

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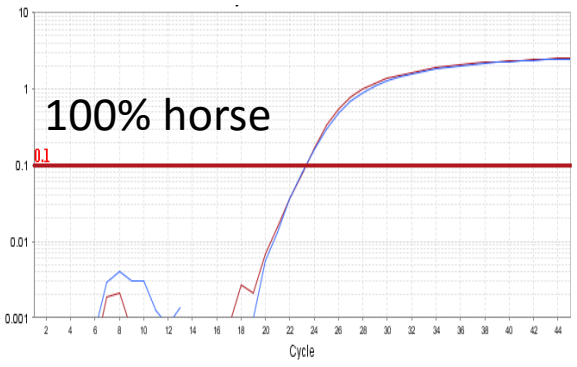
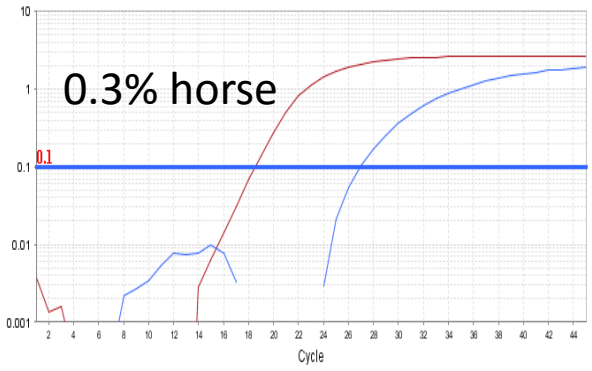
4 quantification approaches

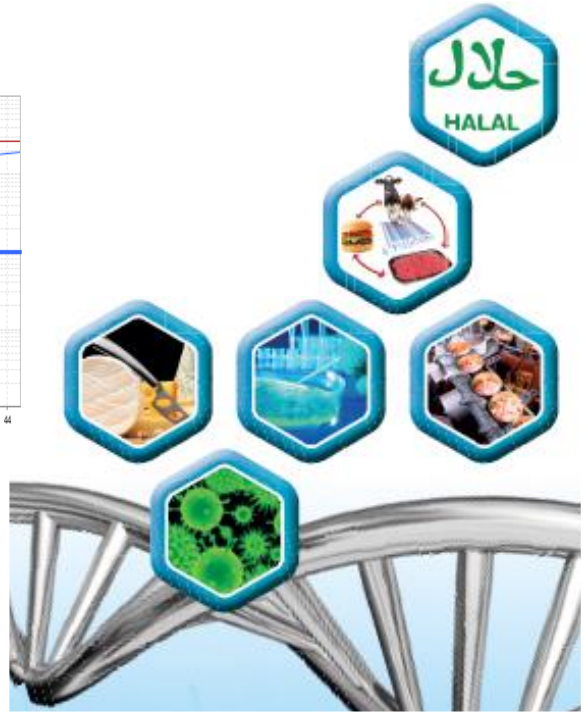
Dilution curve → EU method → ∑ species → **Easyfast™ test**

Progenus EasyFast™ method

Principle : the quantity of DNA of the species is quantified in % of the quantity of vertebrate DNA







Real quantification
Accounts for technological processes & unknown species

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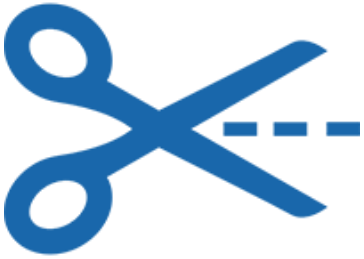
Species that can be detected and quantified

- ✓ Horse
- ✓ Pig
- ✓ Beef
- ✓ Chicken
- ✓ Turkey
- ✓ Sheep
- ✓ Goat
- ✓ Duck
- ✓ Dog
- ✓ Cat
- ✓ Rat
- ✓ …



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Methods of quantification

Dilution curve → EU method → ∑ species → Easyfast™ test

	Dilution curve	EU	7 species	EasyFast™
Matrix effect	NO	YES & NO	YES	YES
Cooking, shearing, … *	NO	NO	YES	YES
False neg due to human errors	NO	NO	NO	YES
Presence of unknown species ?	YES	YES	NO	YES

*The difference in quantitative DNA results between a low processed and a highly processed meat product is reported to be around 10-fold (*Laube et al, 2007, Int. J. Food Sci Technol, 42: 336-41*)

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Special thanks

Gembloux Agro-Bio Tech
Université de Liège

Wallonie
SPW
Service public
de Wallonie
DGO 6

Contact: renaville.r@progenus.be
+ 32-(0)81-616901