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Beta-Agonist Control Project: A Case Study in Thailand

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Thailand

Beta-agonists (β -agonist)



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Pharmaceutical : Human Drugs

- Asthma and other pulmonary diseases treatment
(Bleecker et al., 1993; Tashkin et al., 2010)

Livestock: Leanness - enhancing substances

- Enhance muscle growth
- Decrease fat deposition (Fiems, 1987)

- Long Term Effects on Humans

- Fast heart rate
- Widening of blood vessel
- Muscle tremor
- Nervousness
- Metabolic disturbances

Beta-agonists (β -agonist)



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- **Notification of Ministry of Agriculture and Cooperatives, Thailand**
 - β -agonists contaminated meat is inappropriate for food.
- **Food Act, Ministry of Public Health Thailand**
 - β -agonist in food is forbidden.



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The β -agonists Banning in Thailand

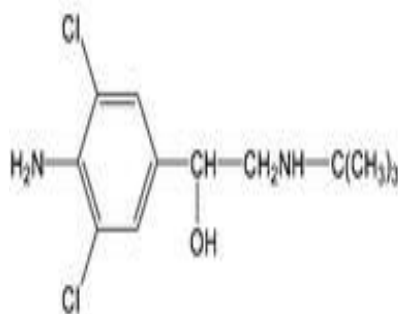
***Beta-
agonists***

- Clenbuterol
- Salbutamol
- Ractopamine
- Zilpaterol
- Terbutaline
- Cabuterol
- Cimbuterol
- Clenpenterol
- Mabuterol
- Tulobuterol

Beta-agonists in Thailand

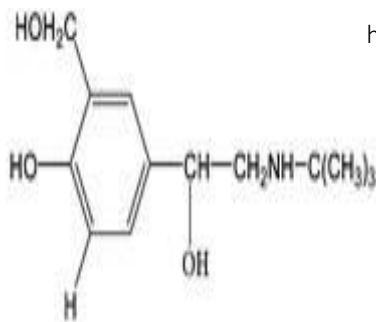


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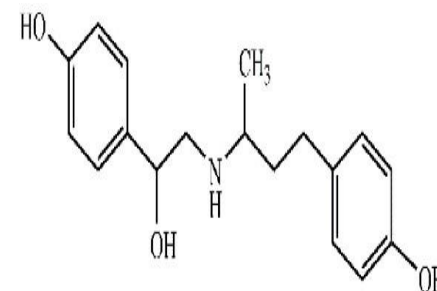
Clenbuterol

<https://pubs.rsc.org/en/content/articlehtml/2013/ay/c3ay40100f>



Salbutamol

<https://pubs.rsc.org/en/content/articlehtml/2013/ay/c3ay40100f>



Ractopamine

<https://www.mdpi.com/1424-8220/18/6/1870>

Meat Consumption in Thailand from 2006 -2016



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Why do some Thai farmers use β -agonist?



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Consumer: prefer red and leaner meat.

Farmer: have more profit in commercial meat production.

Agency Responsibility for controlling Beta-agonists in Thailand



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**Ministry of Agriculture and
Cooperatives**



Department of Livestock
Development
(DLD)

Ministry of Public Health



Food and Drug Administration
(FDA)

Feed



Farm



Slaughterhouse



Market





Tools to control Beta-agonists in Thailand

Ministry of Agriculture and Cooperatives

- **Animal Feed Quality control Act**
 - Forbid to produce, sale, import and use β -agonist as additive substance in animal feed and water
- **Animal Slaughter Control and Meat Sale Act**
 - The animals have to be tested β -agonist before slaughter.
 - If β -agonist is found in animals, they are detained until β -agonist is free.

Ministry of Public Health

- **Food Act**
 - β -agonist is forbidden to put/mix in food.

Legal Penalties



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Animal Feed Quality control Act

-Up to 3 years in prison and/or a fine of up to 60,000 baht for those who use Beta-agonist to feed the animal

Animal Slaughter Control and Meat Sale Act

-Up to 1 year in prison and/or a fine of up to 100,000 baht for those who slaughter the animal without permission

- Animals with Beta-agonist found at the slaughterhouse must be detained until free from B-agonist

Responsibility of Department of Livestock Development of Livestock Development



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Slaughterhouse



Movement



Farm



Collect feed and water sample

Laboratory for β -agonist testing

Positive

To prosecute farm owner

Urine sample

Laboratory for β -agonist testing

Positive

Negative

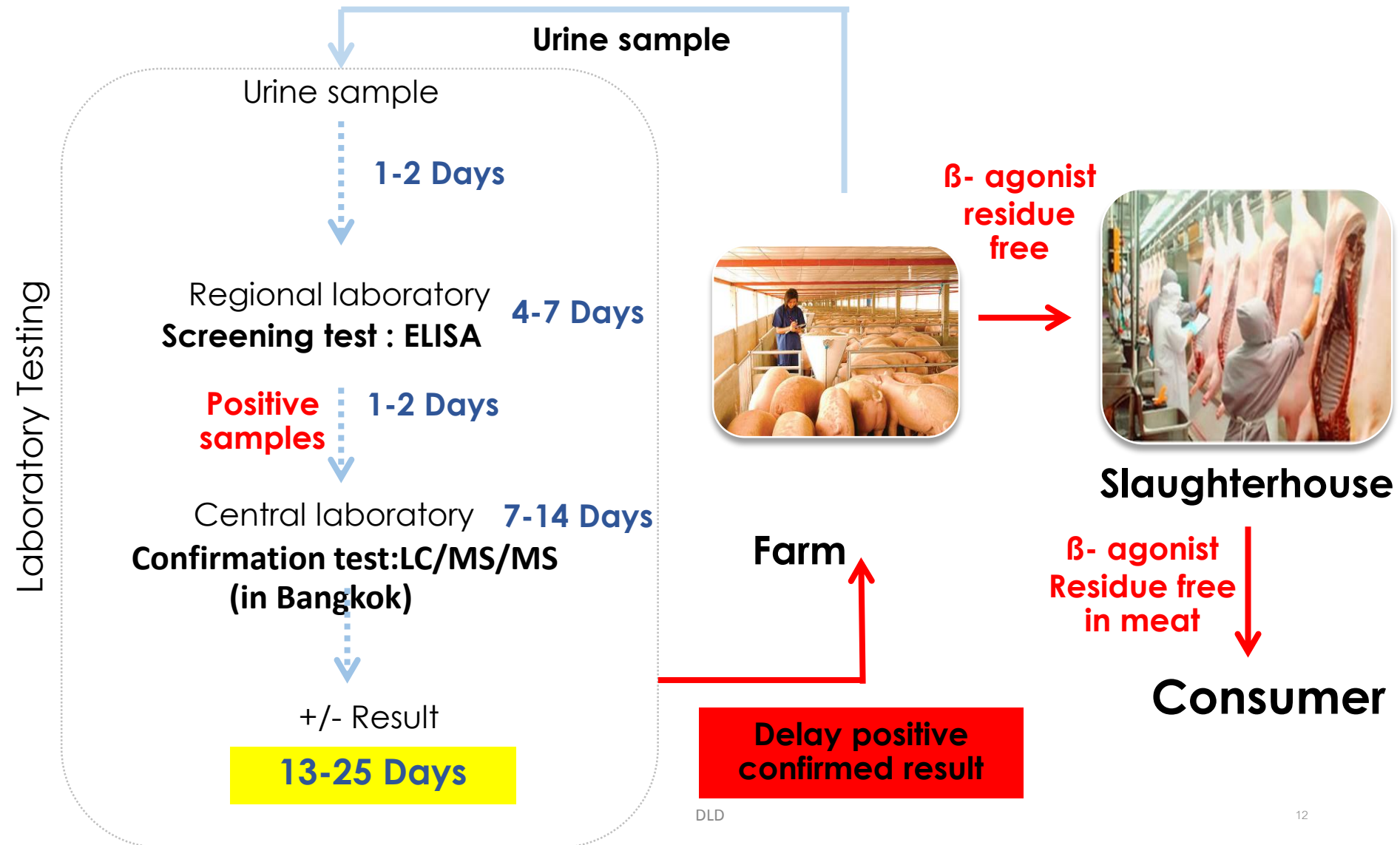
To control β -agonist at farm in 1999-2014

Weakness to Control β -agonist of Thailand in 1999 - 2014



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Before and after the control project implementation

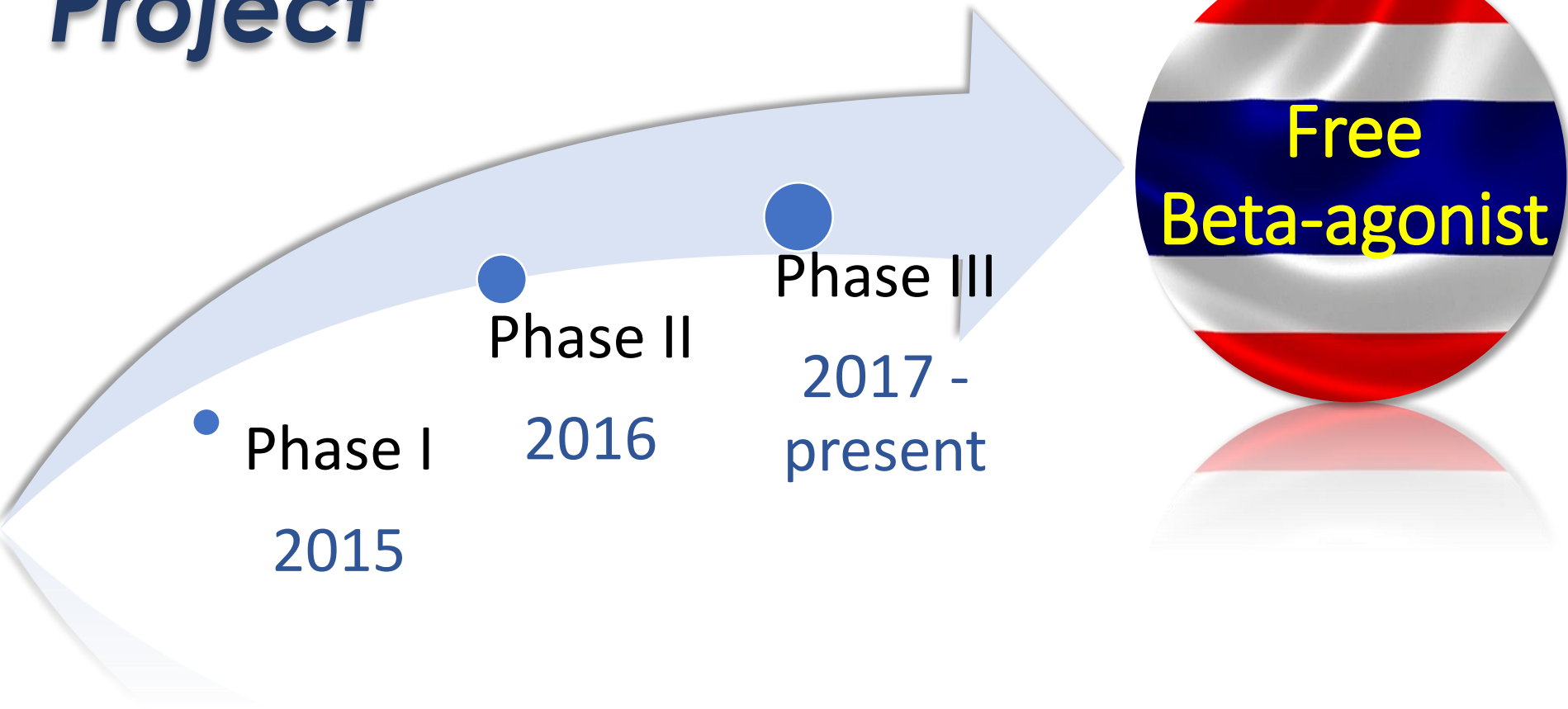
In 2014 and Before	From 2015 onwards
1. Urine samples taken from pig farms	1. Urine samples taken from slaughterhouses
2. Screening test conducted at regional labs and took 5-7 days to receive the results	2. Screening test conducted at slaughterhouses and take approximately 10 minutes to receive the results
3. Sample test confirmation conducted at the central lab in Bangkok and took 10 days to receive the results	3. Sample test confirmation conducted at the regional labs and take 3 days to receive the results



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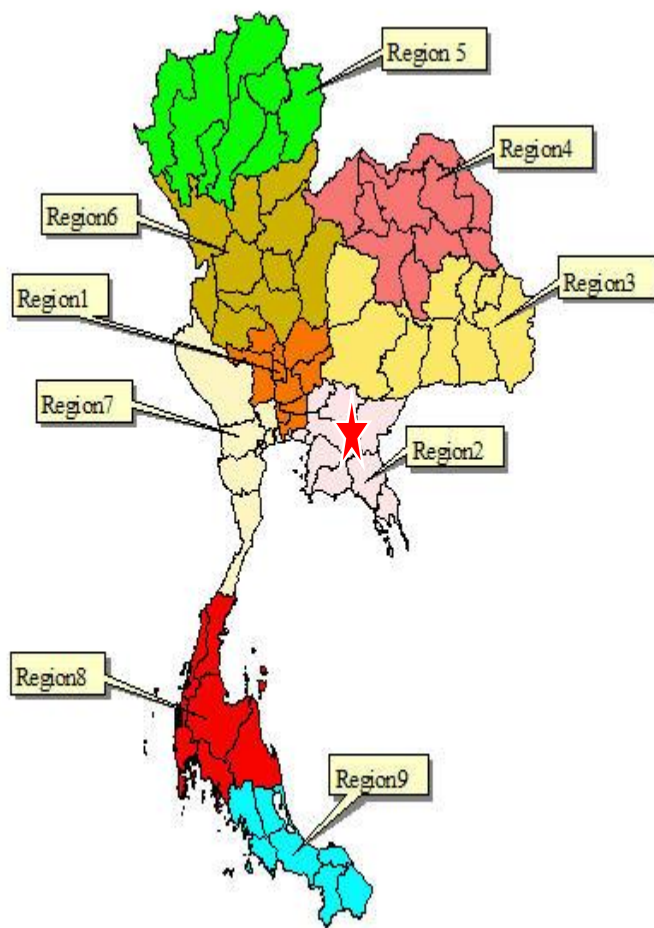
Beta-agonist Control Project



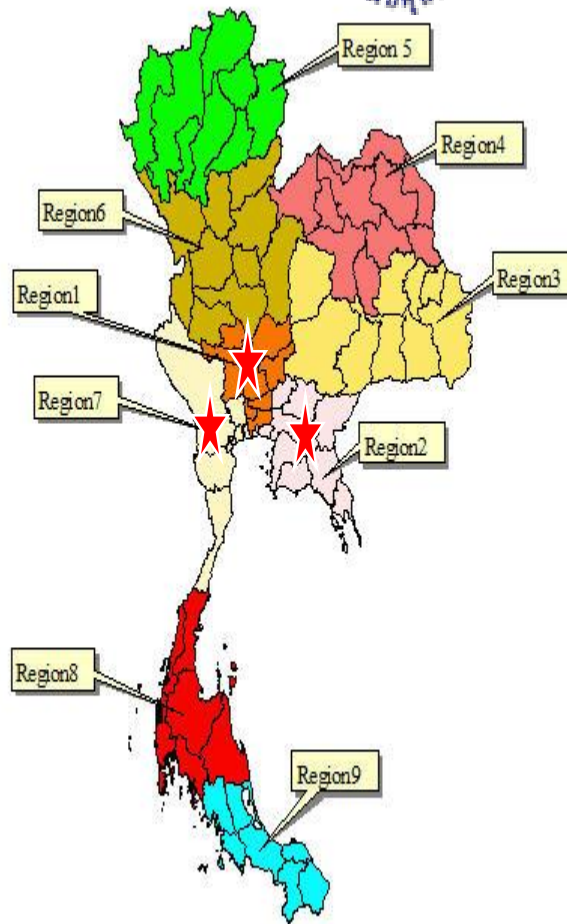


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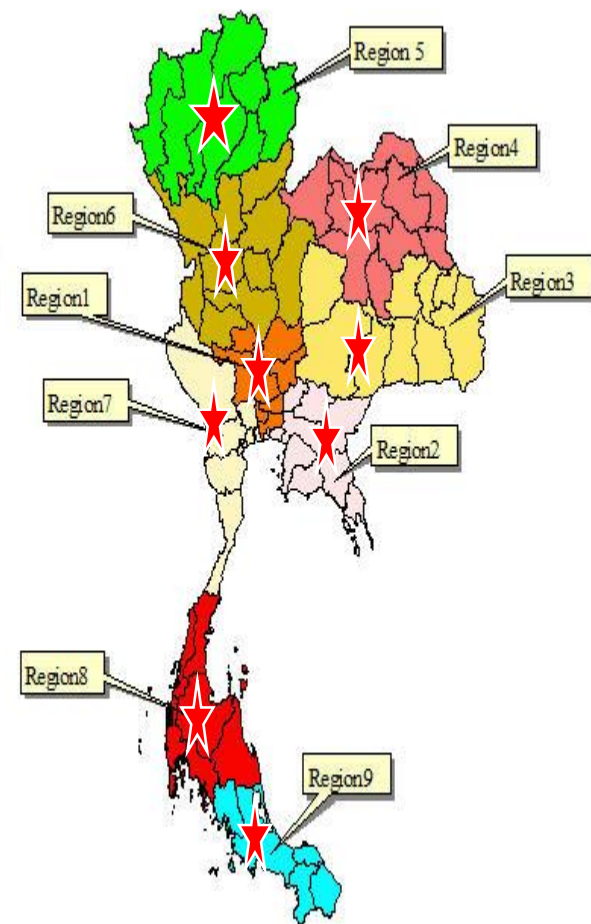
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**Phase I (2015) :
Pilot Project**



**Phase II (2016) :
Expanded Project**



**Phase III (2017):
Country Wide Project**

Phase I

β -agonist Control at Slaughterhouse



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At the Slaughterpen
To collect animal urine
30-50 mL



Negative result

Positive sample



To screen β -agonist in urine at
slaughterpen by strip test (10 min)



To confirm β -agonist
at laboratory by GC-MS
(1-3 days)

Positive result



To detain animal for β -agonist confirmation test
“Control of Slaughter and Distribution of Meat Act”

Phase I

β -agonist Control at Slaughterhouse



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β agonist free

Negative Result



To detain animal until animal free β -agonist

strip test for screening β -agonist



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Validate the strip test before it is used:

Sensitivity $\geq 99\%$

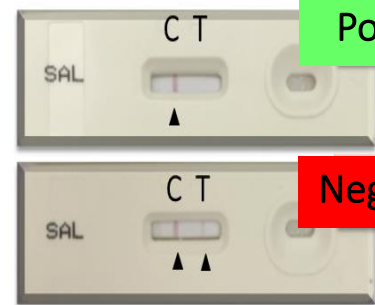
Specificity $\geq 99\%$

Limit of Detection (LOD)



3 drops
of urine sample

5-10 min



Positive

Negative

Lateral flow immunochromatography

Animal	LOD (ppb)		
	Salbutamol	Clenbuterol	Ractopamine
Swine	5	3	3



DLD



Confirmation Method of β -agonist



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Gas Chromatography - Mass Spectrophotometry (GC-MS)

To analyze and confirm by
identifying chemical structure
of β -agonist with Mass
Spectrophotometry
(European commission, 2002)

1-3 Days



Pig farmers warned not to use Beta-agonist or face imprisonment



BANGKOK: Pig raisers are warned to not use Beta-agonist to feed their pigs otherwise they may face imprisonment.

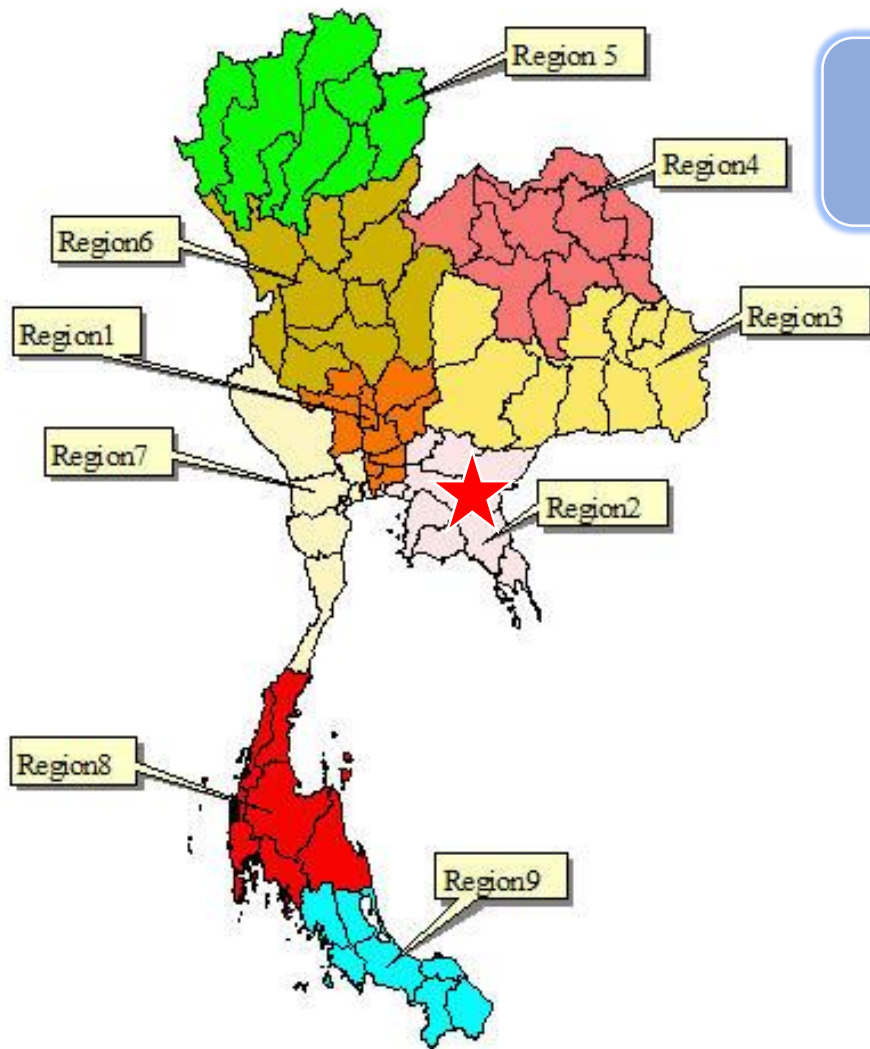


Phase I (2015)



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Outputs

Slaughterhouse	Region 2
Inspected Animals	8,779 pigs
Total Screening Test	407 samples
Confirmed β -agonist positive samples	54 samples
Detained Animals	1,246 pigs

Phase I (2015)



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Consequence

People can consume
beta-agonist free
meat.



Phase II

Phase II

β -agonist Control at Slaughterhouse



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At the Slaughterpen
To collect animal urine
30-50 mL/pig



Negative result



To screen β -agonist in urine at
slaughterpen by strip test (10 min)

Positive result



To detain animal for β -agonist confirmation
“Control of Slaughter and Distribution of Meat Act”

Positive
sample



To confirm β -agonist
at laboratory by GC-MS
(1-3 days)

Phase II

β -agonist Control at Slaughterhouse



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**Confirmed
Positive Result**



To detain animal until free from
 β -agonist

**“Control of Slaughter and Distribution
of Meat Act”**



Free- β agonist

Trace back to farm
and investigate the
farm owner



To prosecute farm owner
under
**“Animal Feed Quality
control Act”²⁴**

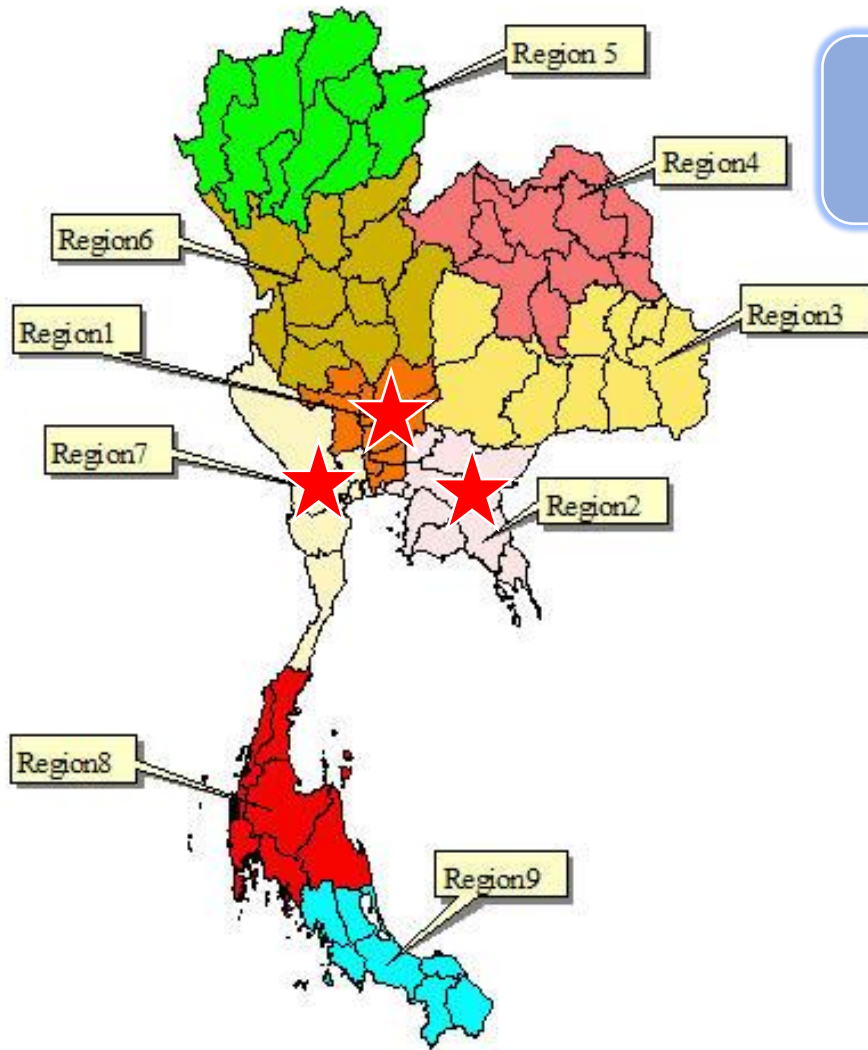


Phase II (2016)



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Outputs

Slaughterhouse

Inspected Animals	23,810 pigs
Total Screening Test	1,099 samples
Confirmed β -agonist positive samples	68 Samples
Detained Animals	2,060 pigs
Prosecution	59 farm owners

Phase II (2016)



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Farm owner penalty: (Animal Feed Quality control Act)

Region	Number of farm owner penalty (cases)		
	2 to 6 months imprisonment	Fine of 5,000 baht up to 10,000 baht	Total
Region 1	0	9	9
Region 2	13	0	13
Region 7	0	37	37
Total	13	46	59

Phase II (2016)



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Consequences

1. People can consume beta-agonist free meat.
2. Farm owners will be accused of committing against the Act. The legal action is taken.
3. Entrepreneurs are given fair trade.



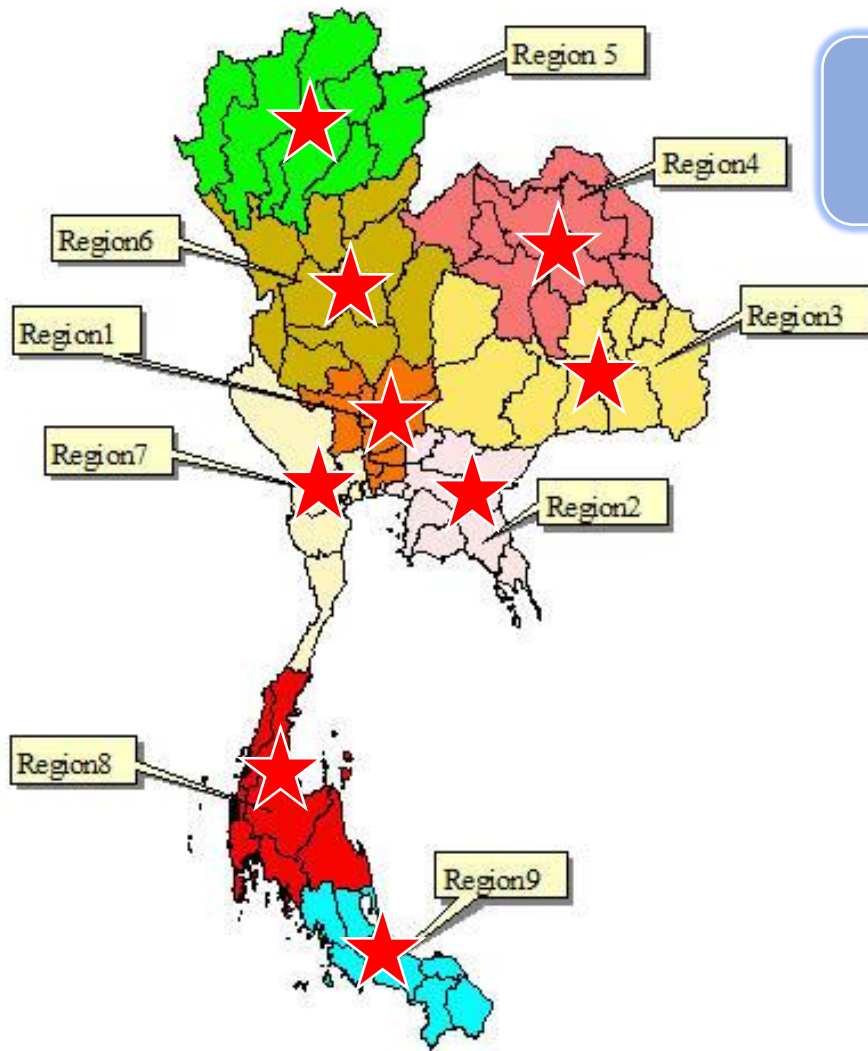
Phase III

Phase III (2017)



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Outputs

Slaughterhouse

Inspected Animals	62,449 pigs
Total Screening Test	2,816 samples
Confirmed β -agonist positive samples	68 Samples
Detained Animals	6,207 pigs
Prosecution	38 farm owners

Phase III (2017)



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Farm owner penalty: (Animal Feed Quality Control Act)

Region	Number of farm owner penalty (case)		
	2 to 6 months imprisonment	Fine of 5,000 baht up to 10,000 baht	Total
Region 1	0	1	1
Region 2	0	6	6
Region 3	0	37	37
Region 4	0	1	1
Region 5	0	0	0
Region 6	0	2	2
Region 7	0	20	20
Region 8	0	3	3
Region 9	0	5	5
Total	0	38	38

DLD

From 2015 onwards	Overall Output	Consequences	Remarks
<p>Phase I: Processes</p> <p>:Urine samples taken from slaughterhouses</p> <p>:Screening test conducted at slaughterhouses and take approximately 10 minutes to receive the results</p> <p>: Sample test confirmation conducted at the regional labs and take 3 days to receive the results</p>	15 cases were detained.	1. People can consume beta-agonist free meat.	Region 2
<p>Phase II: Processes</p> <p>the same as Phase I</p>	59 cases were detained and 59 farm owners were prosecuted.	<p>1.People can consume beta-agonist free meat</p> <p>2.Farm owners are accused of committing against the Act. The legal action is taken.</p> <p>3.Entrepreneurs are given fair trade.</p>	Regions 1, 2, 7
<p>Phase III: Processes</p> <p>the same as Phase II</p>	38 cases were detained and 38 farm owners were prosecuted.	<p>1.People can consume beta-agonist free meat</p> <p>2.Farm owners are accused of committing against the Act. The legal action is taken.</p> <p>3.Entrepreneurs are given fair trade.</p>	Regions 1-9 (cover all regions in Thailand)

Discussion

Effective
implementation
process

True
collaboration

Strive for
consumers'
priority

















Thank you for your attention

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