PD vaccination for Rainbow Trout: safe and efficacious

PD TriNation

13th to 15th March, 2018

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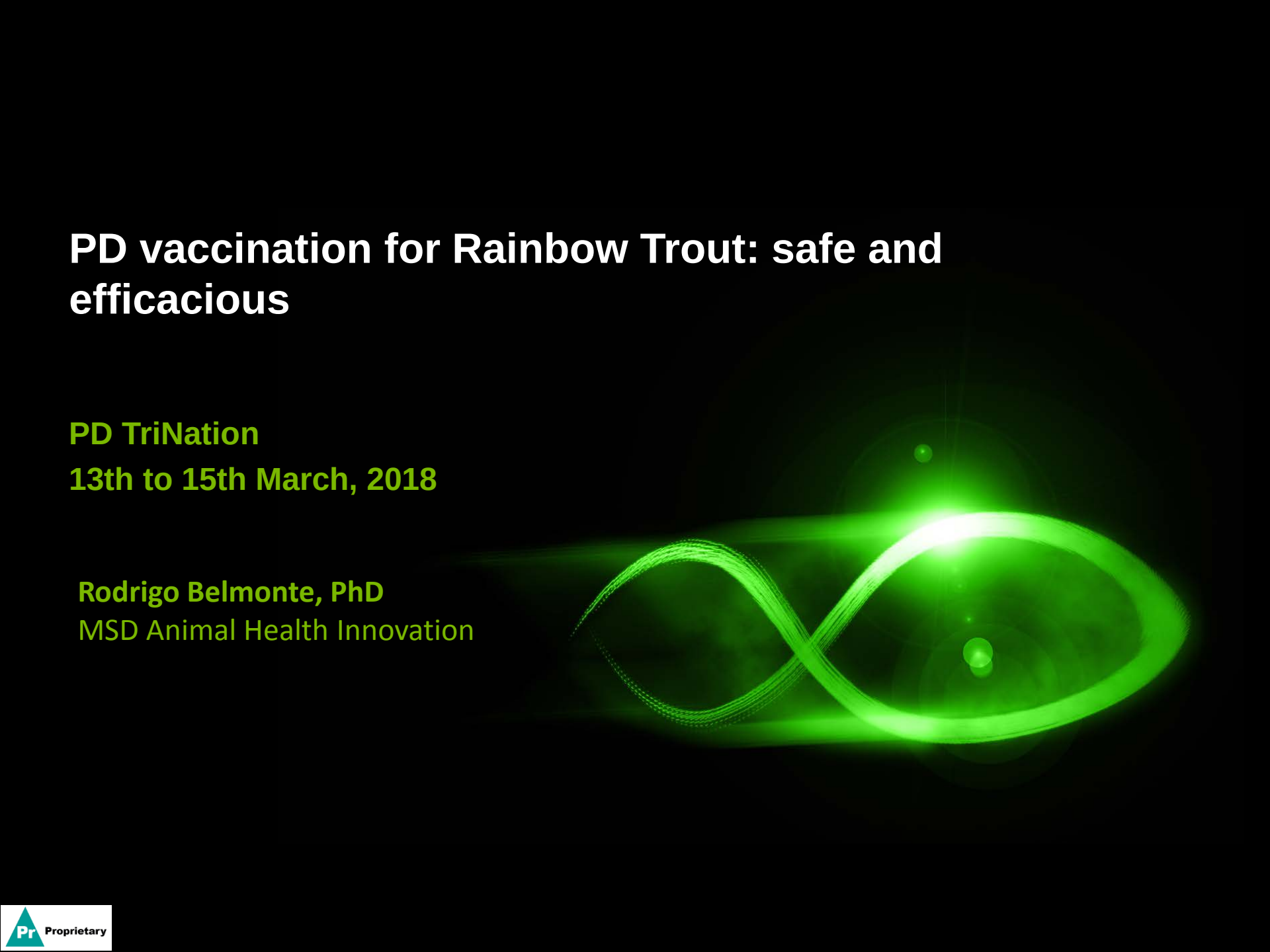

Atlantic salmon and rainbow trout farming in Norway

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Pancreas disease (PD)

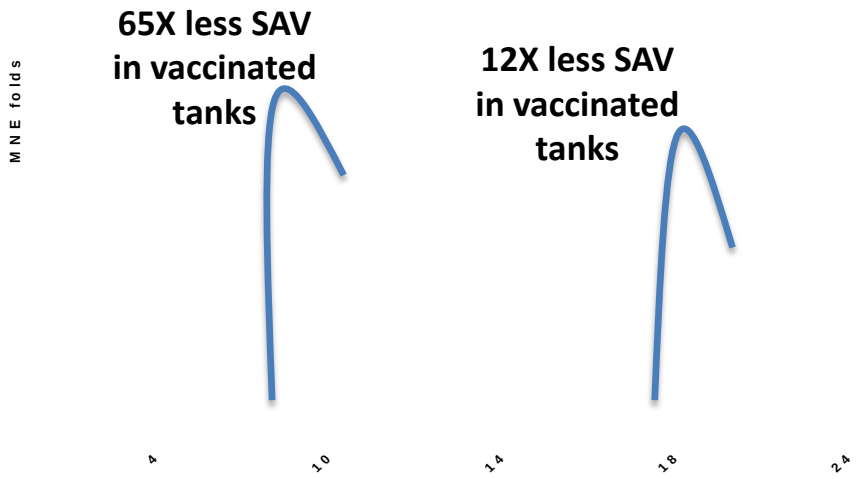
- **SAV infects both rainbow trout and Atlantic salmon in the sea.**
- **Rainbow trout and Atlantic salmon can develop PD but in trout it is less severe.**
- **The majority of outbreaks occurs during summer and autumn.**
- **Water contact to infected sites is the major factor for transmission.**

Pancreas disease (PD)

- **Challenge pressure affects severity of disease.**
- **Almost all Atlantic salmon in the endemic zone are vaccinated but rainbow trout are not.**
- **Infected rainbow trout can shed SAV and infect salmon present in the vicinity.**

Why vaccinate rainbow trout? Shedding! (from TriNation 2016)

Effect of monovalent PD vaccine in rainbow trout shedding:
6 weeks at 12°C, SAV3 challenge, water sampled and tested 4 to 24 days post-challenge.



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Pancreas disease (PD)

- **Challenge pressure affects severity of disease.**
- **Almost all Atlantic salmon in the endemic zone are vaccinated but rainbow trout are not.**
- **Infected rainbow trout can shed SAV and infect salmon present in the vicinity.**
- **New regulation!**

PD vaccination

§ 7. *Vaccination against PD*

Salmon and rainbow trout farmed (production and broodstock) in the area extending from Taskneset (Fræna) to the south, to Langøya at Kvaløya (Sømna) in the north, **must be vaccinated against PD**.

The Norwegian Food Safety Authority may impose a vaccination against PD in other areas if this becomes necessary.

Section 7 comes into force from the time the ministry decides.

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PD vaccination for rainbow trout:

Efficacy of PD vaccination in rainbow trout:

- **Prevalence**
- **Shedding**
- **PD pathology**

Safety of PD vaccination in rainbow trout:

- **Field study**
- **Production cycle (ongoing)**

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PD vaccination for rainbow trout:
- Lab efficacy (prevalence and shedding through faeces)

Efficacy trial of monovalent PD vaccine in rainbow trout: 6 weeks at 12°C, SAV3 challenge, viraemia and shedding tested 10 days post challenge:

Treatment	Prevalence (pos./total)	Shedding (faeces, pos./total)
Mono- PD	0/35	0/33
Saline	20/35	17/34

PD vaccination for rainbow trout:
- Lab efficacy (heart and pancreas pathology)

Efficacy trial of monovalent PD vaccine in rainbow trout: 6 weeks at 12°C, SAV3 challenge, heart and pancreas histology 4 weeks post-challenge:

Treatment	Heart scores (0-4)					Pancreas scores (0-3)			
	0	1	2	3	4	0	1	2	3
Mono- PD	3%	97%	-	-	-	94%	3%	3%	-
Saline	14%	66%	20%	-	-	50%	6%	27%	17%

6%

50%

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PD vaccination for rainbow trout:
- Field study

Field safety trial monovalent PD vaccine in combination with multivalent vaccine (simultaneous + and concurrent →) in rainbow trout together with Blom Fiskeoppdrett:

Site	Treatment	Number of fish	Tanks
A	Mono-PD + Hexavalent	90 000	1 and 2
A	Mono-PD → Hexavalent	120 000	3 and 4
B	Mono-PD + Hexavalent	130 000	3 and 4
B	Mono-PD → Hexavalent	120 000	5 and 6

*** 240 dd between concurrent regime**

PD vaccination for rainbow trout:
- Field study: safety (local reactions at harvest)

Field safety trial monovalent PD vaccine in combination with multivalent vaccine (simultaneous + and concurrent →) in rainbow trout together with Blom Fiskeoppdrett:

Site	Treatment	№ of fish	Mean adhesion	Adhesion scores (0-6)			
				0	1	2	3
A	Mono-PD + Hexavalent	30	0.9	17%	73%	10%	-
A	Mono-PD → Hexavalent	30	1.0	10%	83%	7%	-
B	Mono-PD + Hexavalent	30	1.1	7%	73%	20%	-
B	Mono-PD → Hexavalent	31	1.2	9%	68%	23%	3%

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PD vaccination for rainbow trout:
- Field study: safety (melanin on abdominal wall at harvest)

Field safety trial monovalent PD vaccine in combination with multivalent vaccine (simultaneous + and concurrent →) in rainbow trout together with Blom Fiskeoppdrett:

Site	Treatment	Nº of fish	Mean melanin	Melanin scores (0-3)			
				0	1	2	3
A	Mono-PD + Hexavalent	30	0.5	53%	47%	-	-
A	Mono-PD → Hexavalent	30	0.6	40%	57%	3%	-
B	Mono-PD + Hexavalent	30	0.0	100%	-	-	-
B	Mono-PD → Hexavalent	31	0.7	32%	68%	-	-

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PD vaccination for rainbow trout:
- Field study: performance (Specific Growth Rate)

Field safety trial monovalente PD vaccine in combination with multivalent vaccine (simultaneous + and concurrent →) in rainbow trout together with Blom Fiskeoppdrett:

Period	Mono-PD + Hexavalent site A	Mono-PD + Hexavalent site B	Mono-PD → Hexavalent site A	Mono-PD → Hexavalent site B
Vaccination to sea transfer	0.92 %		0.94 %	
Sea transfer to harvest	0.86 %	0.82 %	0.80 %	0.78 %

PD vaccination for rainbow trout:
- Field study: performance (fillet quality)

Field safety trial monovalent PD vaccine in combination (simultaneous) with multivalent vaccine in rainbow trout together with Blom Fiskeoppdrett (Site A; cage 1):

Quality	Number of fish	Percentage
Superior	19 768	86%
Ord	1 023	4%
Ord 1	1 764	8%
Ord 2	93	0%
Discarded	397	2%
Total	23 045	100%

Mono-PD + Hexavalent simultaneous

PD vaccination for rainbow trout:
- Production cycle (2017-2018)

An heptavalent current generation PD vaccine is being used in a production cycle at a commercial farm from Blom Fiskeoppdrett.

Cage	Treatment	Number of fish
3	Heptavalent PD	86 233
4	Heptavalent PD	61 762
5	Heptavalent PD	93 858
6	Heptavalent PD	98 803

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PD vaccination for rainbow trout:
- Production cycle (local reactions at sea transfer)

Safety of heptavalent PD vaccine in rainbow trout in Blom Fiskeoppdrett production cycle:

Cage	Treatment	№ of fish	Mean adhesion	Adhesion scores (0-6)			
				0	1	2	3
4	PD Heptavalent	15	1.1	0%	87%	13%	-
6	PD Heptavalent	15	1.1	0%	87%	13%	-

PD vaccination for rainbow trout:
- Production cycle (melanin on abdominal wall at sea transfer)

Safety of heptavalent PD vaccine in rainbow trout in Blom Fiskeoppdrett production cycle:

Cage	Treatment	№ of fish	Mean melanin	Melanin scores (0-3)			
				0	1	2	3
A	PD Heptavalent	15	0	100%	-	-	-
B	PD Heptavalent	15	0	100%	-	-	-

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PD vaccination for rainbow trout:
- Production cycle (local reactions at mid production)

Safety of heptavalent PD vaccine in rainbow trout in Blom Fiskeoppdrett production cycle:

Cage	Treatment	№ of fish	Mean adhesion	Adhesion scores (0-6)			
				0	1	2	3
3	PD Heptavalent	15	0.9	20%	73%	7%	-
4	PD Heptavalent	15	0.8	47%	27%	27%	-
5	PD Heptavalent	15	0.9	13%	87%	-	-
6	PD Heptavalent	15	0.8	13%	80%	7%	-

PD vaccination for rainbow trout:
- Production cycle (melanin on abdominal wall at mid production)

Safety of heptavalent PD vaccine in rainbow trout in Blom Fiskeoppdrett production cycle:

Cage	Treatment	№ of fish	Mean melanin	Melanin scores (0-3)			
				0	1	2	3
3	PD Heptavalent	15	0	100%	-	-	-
4	PD Heptavalent	15	0.07	93%	7%	-	-
5	PD Heptavalent	15	0	100%	-	-	-
6	PD Heptavalent	15	0	100%	-	-	-

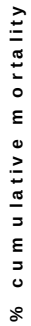
PD vaccination for rainbow trout:
- Production cycle: performance (Specific Growth Rate)

Performance of heptavalent PD vaccine in rainbow trout in Blom Fiskeoppdrett production cycle:

Period	Cage 3	Cage 4	Cage 5	Cage 6
Sea transfer to mid production (Aug 2017- Feb 2018)	1.13%	1.24%	1.16%	1.16%

PD vaccination for rainbow trout:
- Production cycle: mortality after sea transfer

Cumulative mortality of heptavalent PD vaccinated rainbow trout in Blom Fiskeoppdrett production cycle:



PD vaccination for rainbow trout:

- **Efficacy:**
  - **Reduces the number of infected fish**
  - **Reduces pancreas lesions**
  - **Reduces the amount of viral particles shed into water**

- **Safety:**
  - **Low adhesions and melanin scores**
  - **No impact on growth**
  - **No impact on fillet quality**

➢ **PD vaccination of rainbow trout is safe and reduces the risk of transmission to Atlantic salmon.**

Questions?