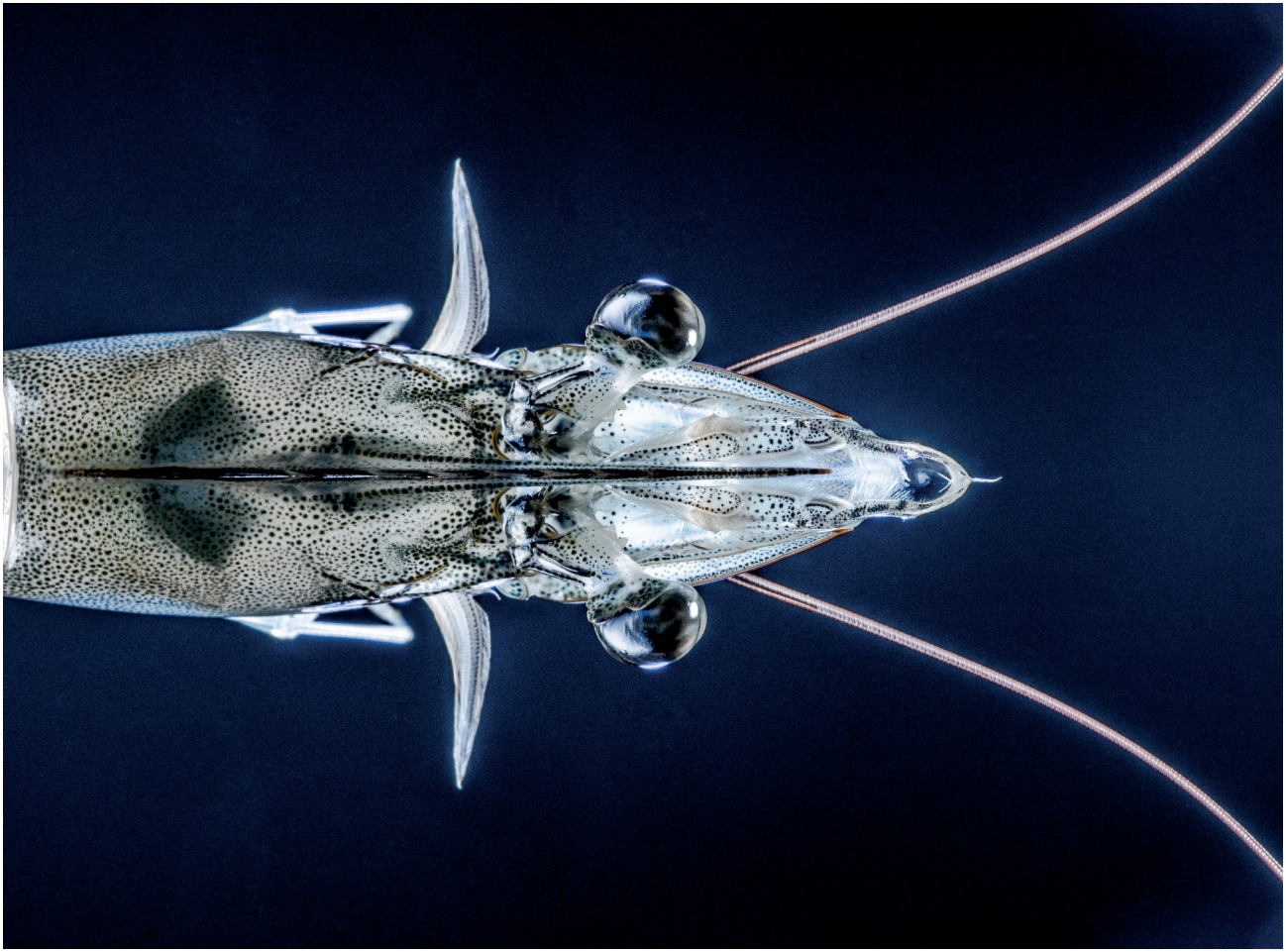
lorica™

The fine art of protection



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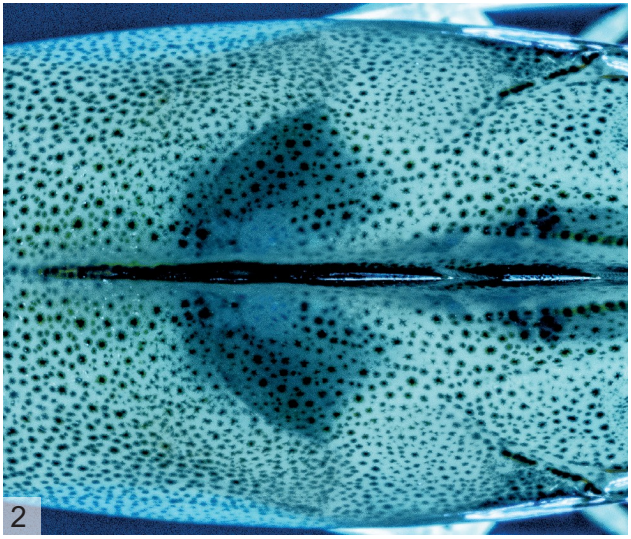
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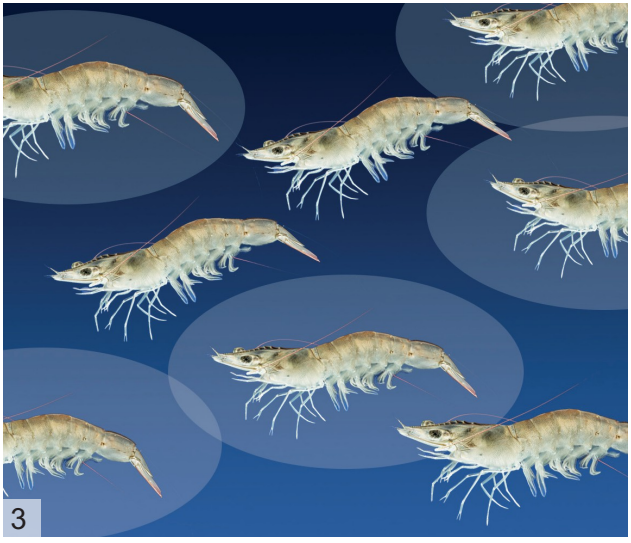
Strengthening essential barriers

Lorica supports the primary defences of shrimp from environmental threats. It also acts to improve the structure of the digestive tract and hepatopancreas, and their ability to resist pathogens.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Functional ingredients

Lorica diets contain a complex profile of innovative functional ingredients designed to safeguard shrimp during challenging phases in their life cycle, including transfer and handling.

Population safeguarding

Improved shielding of a shrimp from pathogenic bacteria not only improves the viability of that individual but reduces the potential of release of bacteria to infect other shrimp. This concept reduces the epidemic potential of an infection outbreak.

1. *Penaeus vannamei*
2. *Dorsal view of the hepatopancreas*
3. *Graphic illustration of population safeguarding*

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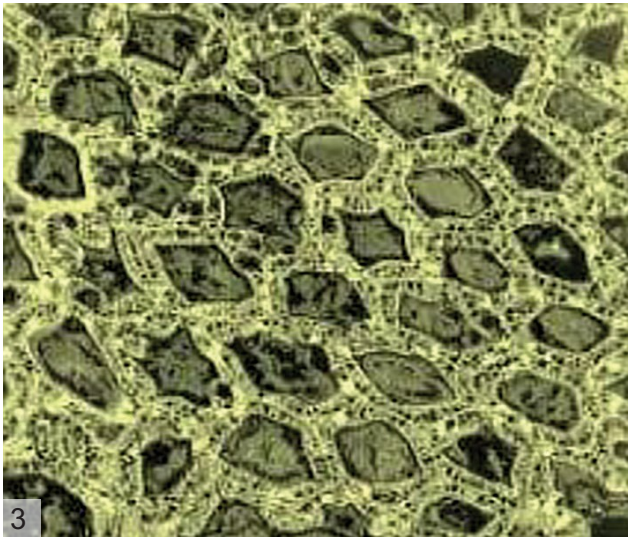

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1.Tail of Penaeus vannamei
2.Penaeus vannamei
3.Light micrograph of the tubular structure of the shrimp hepatopancreas

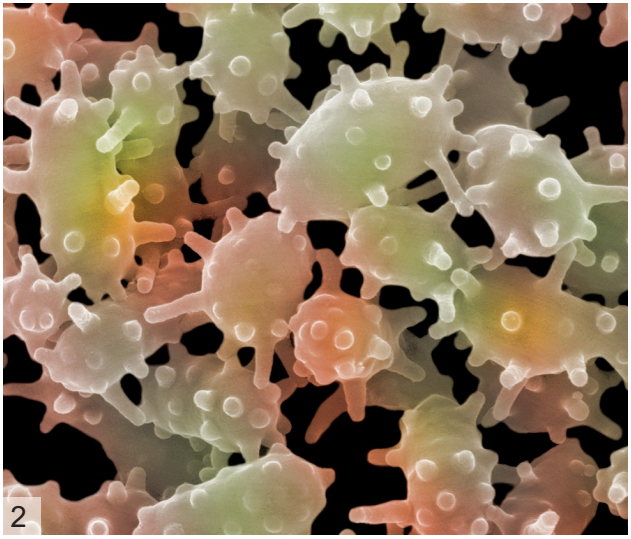
Enhanced immune systems

Lorica's unique formulations deliver invaluable support to the immune responses of shrimp. They also enable shrimp to be better able to cope with stress factors, such as pathogenic challenges.

Safeguarding nutrients

Lorica supports the integrity and function of the hepatopancreas to maintain optimal nutrient absorption.


Balance



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1.Penaeus vannamei
2.Scanning electron micrograph of bacteria from intestinal microbiota.
3.Penaeus vannamei

Withstanding threats

Lorica tips the balance in favour of the shrimp in the battle against hostile microbes and environmental threats by supporting immunological and structural mechanisms.

Easing bacterial impacts

Lorica's component ingredients work together to assist shrimp health. They attack harmful bacteria to reduce their numbers and also inhibit communication among bacteria to limit their impact.

Figure 1 - MIC screening

Minimum inhibitory concentration (MIC) tests define the lowest concentration of a substance required to inhibit growth
of bacteria. Trials were undertaken at the University of Valencia. The components included in Lorica require the lowest
concentration to inhibit growth of *Vibrio*
bacteria compared with other substances tested.

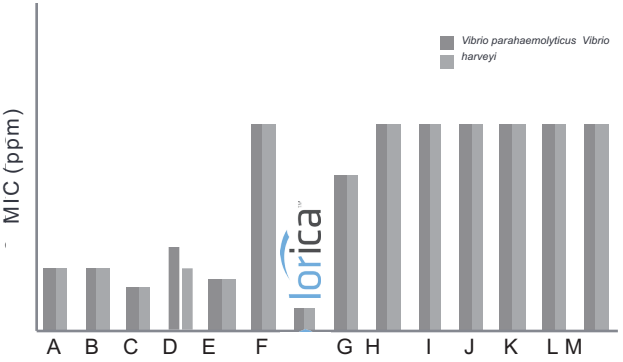


Figure 2 - pH

Trials at the University of Valencia demonstrated that lowering the pH
reduces the survival rate of *Vibrio* bacteria as they do not thrive in acidic conditions.
The components of Lorica have the
potential to decrease the pH of the shrimp gut to inhibit bacterial survival.

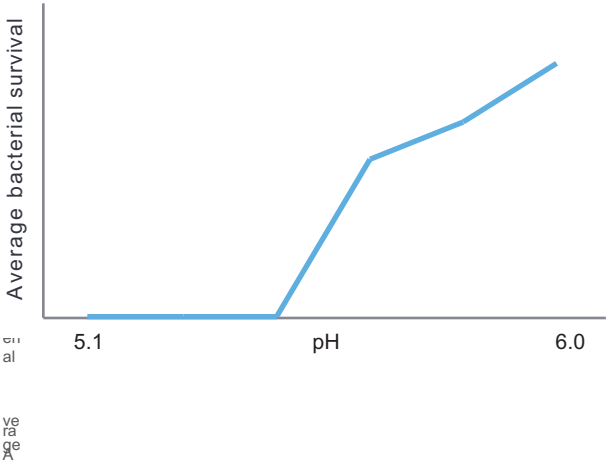


Figure 3 – combined effect

A number of solutions were tested before the Lorica solution was established. It was determined that a combination of different ingredients gave a better protection effect than just one component on its own. In the figure to the right, Diets D and J contain just one of the ingredients, compared with Diet P - the Lorica solution - containing a combination of ingredients. These trials took place at the University of Arizona.

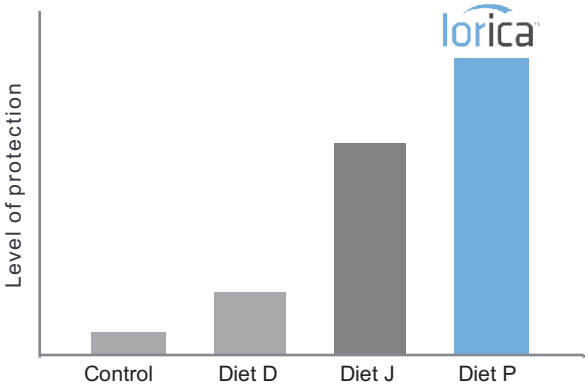
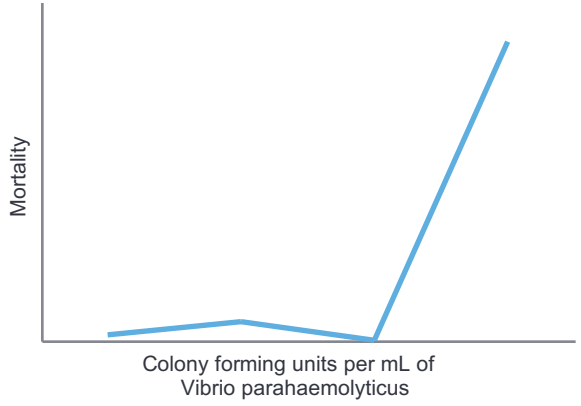


Figure 4 – Critical mass

When *Vibro parahaemolyticus* bacteria reach a certain number they release poison that kills the shrimp. The bacteria communicate to coordinate the release of poison. During testing at the University of Arizona, it was established that there is minimal mortality before a critical mass of bacteria is reached, as shown here. Lorica acts to limit the number of bacteria, and inhibit the communication between them.



Recommendations:

* Feed Lorica for at least 7 days prior to stress event (handling, transfer…) or expected onset of disease, then all the way through the risky period and for at least one week afterwards.
* Lorica can also be used during the whole production cycle in order to improve the farm zootechnical performances.
* The feeding frequency should be of minimum 4 meals per day.

FEEDING GUIDELINE FOR *LITOPENAEUS VANNAMEI*

FEED QUANTITIES GIVEN FOR 100,000 SHRIMP STARTING FROM PL 12

Feed	Day of Culture	Weight (g)	Feeding (kg/day)
LORICA 0	1	0.02	2.0
	2	0.04	2.2
	3	0.08	2.4
	4	0.13	2.6
	5	0.18	2.9
LORICA 1	6	0.24	3.2
	7	0.30	3.5
	8	0.37	3.9
	9	0.44	4.3
	10	0.52	4.7
	11	0.60	5.2
	12	0.69	5.7
	13	0.79	6.2
	14	0.90	6.7
LORICA 2	15	1.02	7.3
	16	1.14	7.9
	17	1.27	8.6
	18	1.41	9.3
	19	1.56	10.0
	20	1.72	10.7
	21	1.89	11.5
	22	2.08	12.3
	23	2.28	13.1
	24	2.48	13.9
LORICA 3	25	2.69	14.7
	26	2.90	15.5
	27	3.12	16.3
	28	3.35	17.1
	29	3.58	17.9
	30	3.81	18.7
	31	4.05	19.6
LORICA 4	32	4.30	20.4
	33	4.55	21.2
	34	4.80	22.0
	35	5.06	22.8
	36	5.32	23.3
	37	5.58	23.9
	38	5.84	24.5
	39	6.11	25.1
	40	6.38	25.7
	41	6.65	26.3
	42	6.92	26.9
	43	7.20	27.5
	44	7.48	28.1
	45	7.76	28.7
	46	8.04	29.2
	47	8.32	29.8
	48	8.61	30.4
LORICA 5	49	8.90	31.0
	50	9.19	31.5
	51	9.48	32.1
	52	9.77	32.6
	53	10.06	33.2
	54	10.35	33.7
	55	10.64	34.3
	56	10.93	34.8
	57	11.22	35.4
	58	11.51	35.9
	59	11.81	36.4
	60	12.11	37.0
	61	12.41	37.5
LORICA 6	62	12.71	38.0
	63	13.01	38.5
	64	13.32	39.0
	65	13.63	39.5
	66	13.94	40.0
	67	14.25	40.5
	68	14.56	41.0
	69	14.88	41.5
	70	15.20	42.0
	71	15.52	42.5
	72	15.84	43.0

Feed	Day of Culture	Weight (g)	Feeding (kg/day)
	73	16.16	43.5
	74	16.48	43.9
LORICA 7	75	16.80	44.4
	76	17.13	44.9
	77	17.46	45.3
	78	17.79	45.8
	79	18.12	46.3
	80	18.45	46.7
	81	18.78	47.2
	82	19.11	47.6
	83	19.43	48.0
	84	19.75	48.5
	85	20.07	48.9
	86	20.39	49.3
	87	20.71	49.8

Feed	Day of Culture	Weight (g)	Feeding (kg/day)
LORICA 7	88	21.03	50.2
	89	21.35	50.6
	90	21.67	51.0
	91	21.99	51.4
	92	22.31	51.8
	93	22.62	52.2
	94	22.93	52.6
	95	23.24	53.0
	96	23.55	53.4
	97	23.86	53.8
	98	24.17	54.2
	99	24.48	54.6
	100	24.79	54.9
	101	25.10	55.3

Feed	Day of Culture	Weight (g)	Feeding (kg/day)
LORICA 8	102	25.41	55.7
	103	25.72	56.0
	104	26.03	56.4
	105	26.34	56.7
	106	26.65	57.1
	107	26.96	57.4
	108	27.26	57.8
	109	27.56	58.1
	110	27.86	58.5
	112	28.16	58.8
	112	28.46	59.1

ADJUSTMENT OF THE FEED QUANTITY WITH FEEDING TRAYS

No feed remaining	Increase the quantity of feed for the next meal by 5%
Remaining feed: < 5%	Keep the same quantity of feed for the next meal
Remaining feed: 5-10%	Decrease the quantity of feed for the next meal by 5%
Remaining feed: 10-25%	Decrease the quantity of feed for the next meal by 10%
Remaining feed: > 25%	Stop feeding for the next meal then start feeding again but decreasing the quatity by 50%. Increase to the normal feeding rate when all feed is consumed.

NUTRITION FACTS

Code	Feed form	Protein (%min)	Fat (%)	Fiber (%max)	Moisture (%max)
Lorica 0	Powder	40	5 - 7	3	11
Lorica 1	Crumble 25-16 mesh	40	5 - 7	3	11
Lorica 2	Pellet 1.0 x 1.5-2 mm	40	5 - 7	4	11
Lorica 3	Pellet 1.2 x 1.5-3 mm	40	5 - 7	4	11
Lorica 4	Pellet 1.4 x 2-4 mm	40	5 - 7	4	11
Lorica 5	Pellet 1.6 x 2-4 mm	38	5 - 7	4	11
Lorica 6	Pellet 1.8 x 2-4 mm	38	4 - 6	4	11
Lorica 7	Pellet 1.8 x 3-5 mm	36	4 - 6	4	11
Lorica 8	Pellet 2 x 3-5 mm	36	4 - 6	4	11

FEEDING TABLE FOR *LITOPENAEUS VANNAMEI*

Code	Shrimp weight (g)	Day of culture (day)	Feeding rate (% of body weight/day)	Feeding (%min)
Lorica 0	< 1.0	< 15	13 - 7	4 - 5
Lorica 1	< 1.0	< 15	13 - 7	4 - 5
Lorica 2	1.0 ~ 2.0	15 - 22	7 -6	4 - 5
Lorica 3	2.0 ~ 4.0	23 - 31	6 - 5	4 - 5
Lorica 4	4.0 ~ 8.0	32- 45	5 - 3.5	4 - 5
Lorica 5	8.0 ~ 12.5	46 - 61	3.5 - 3	4 - 5
Lorica 6	12.5 ~ 16.5	62 - 74	3 - 2.7	4 - 5
Lorica 7	16.5 ~ 25	75 - 101	2.7 - 2.2	4 - 5
Lorica 8	> 25	> 101	2.2 - 2	4 - 5

Lorica #0/10kg
* Powder <0.7mm
* PL 10 - 0.2g

Lorica #1/10kg
* Crumble 25 - 16 mesh
* 0.2 - 1g

Lorica #2/10kg
* Pellet 1.0 - 1.5 - 2mm
* 1 - 2g

Lorica #3/10kg
* Pellet 1.2 x 1.5 - 3mm
* 2 - 4g

Lorica #4/20kg
* Pellet 1.4 x 2 - 4mm
* 4 - 8g

Lorica #5/20kg
* Pellet 1.6 x 2 - 4mm
* 8 - 12.5g

Lorica #6/20kg
* Pellet 1.8 x 2 - 4mm
* 12.5 - 16.5g

Lorica #7/20kg
* Pellet 1.8 x 3 - 5mm
* 16.5 - 25g

Lorica #8/10kg
* Pellet 2.0 x 3 - 5mm
* > 25g

Skretting is the world leader in the manufacture and supply of aqua feeds, making it an essential link in the feed-to-food chain. Total annual production of high quality feed is approximately 2 million tonnes. Skretting has operating companies in five continents to produce and deliver feeds, from hatching to harvest, for more than 60 species of farmed fish and shrimp.

www.skretting.com

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