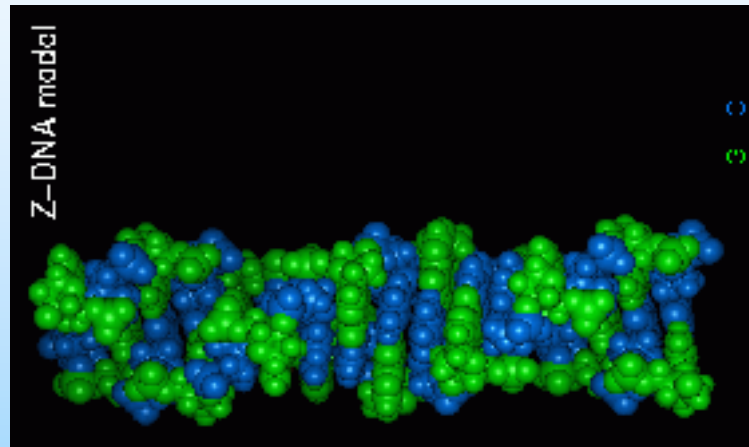
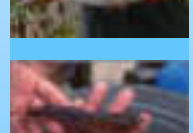


NUCLEO 20

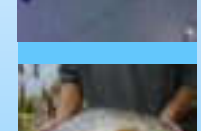


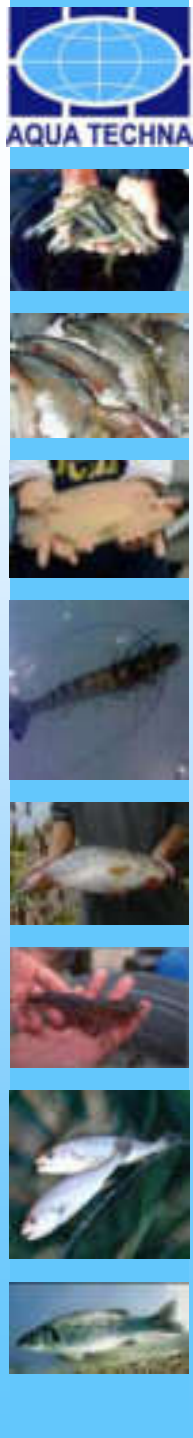
« A well balanced nucleotide supply in aquaculture »



NUCLEO20 TECHNICAL DOSSIER: SUMMARY

- ***1) NUCLEOTIDES ROLE IN AQUACULTURE***
- ***2) NUCLEO20 BENEFITS IN TRIALS***
- ***3) NUCLEO20 INCLUSION IN AQUACULTURE DIETS***



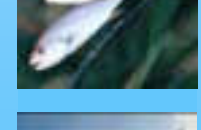
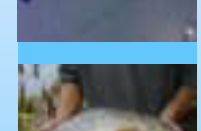


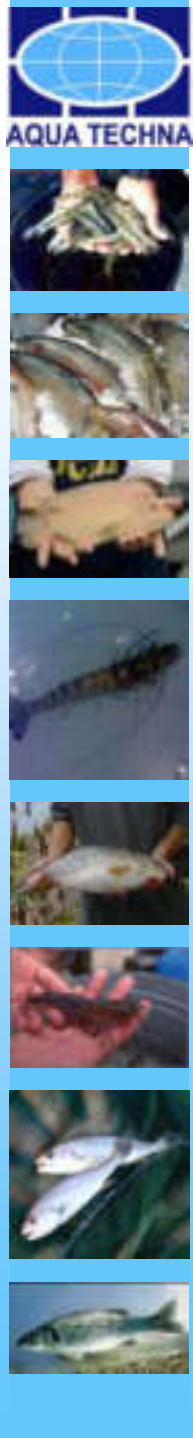
NUCLEO20: PURIFIED NUCLEOTIDES

- ***NUCLEO20 IS A SPECIFIC COMBINATION OF PURIFIED NUCLEOTIDES SPECIFICALLY FORMULATED FOR AQUACULTURE APPLICATIONS.***
- ***NUCLEO20 IS MADE UP OF:***
 - ***NATURALLY OCCURRING RNA,***
 - ***NUCLEOTIDES***
 - ***PRECURSORS OF NUCLEOTIDES,***
 - ***EXTRACTED FROM THE YEAST *SACCHAROMYCES CEREVISIAE****
- ***NUCLEO20 HELPS IMPROVE THE DISEASES RESISTANCE, GROWTH & THE VACCINATION EFFECTIVENESS OF AQUACULTURE SPECIES***

NUCLEO 20

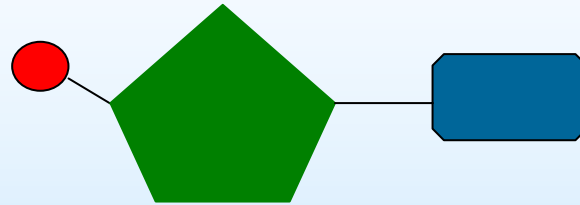
ROLE OF NUCLEOTIDES IN AQUACULTURE





NUCLEIC ACID STRUCTURES: NUCLEOTIDES & DIFFERENT BASES

NUCLEOTIDE DIAGRAM:



PHOSPHATE MOLECULE
PENTOSE SUGAR
BASE

DNA

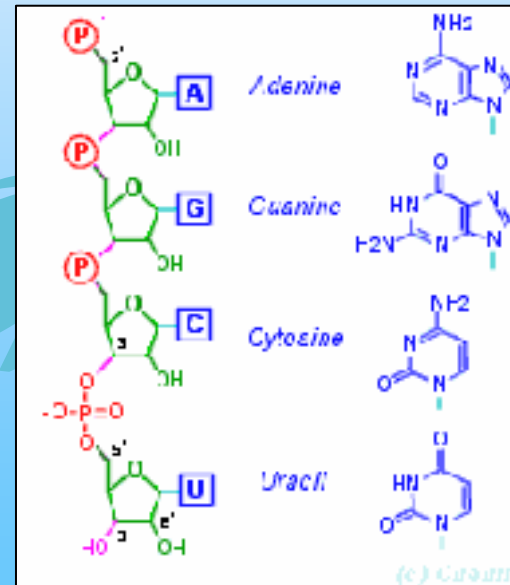
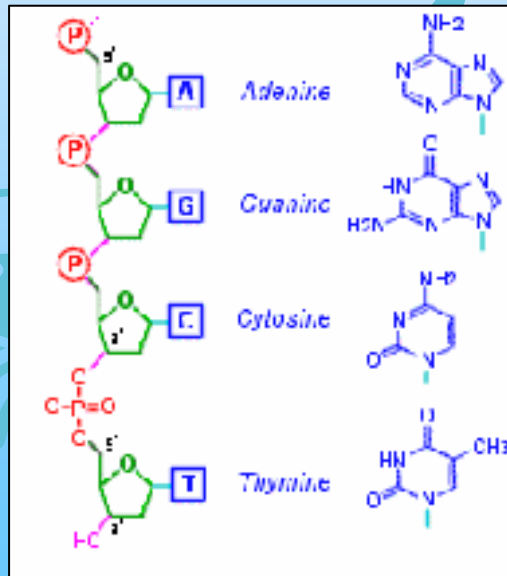
PENTOSE SUGAR = DEOXYRIBOSE

BASES = A G C T

RNA

PENTOSE SUGAR = RIBOSE

BASES = A G C U

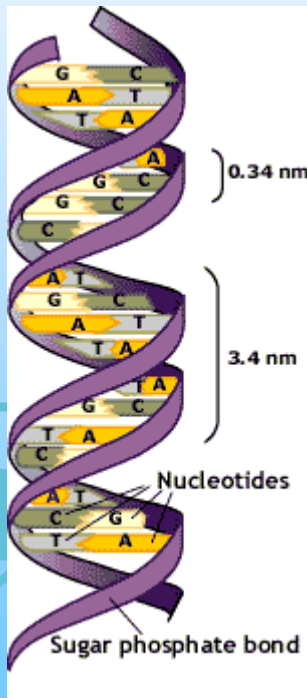


DNA & RNA MOLECULAR STRUCTURES

DNA

PENTOSE SUGAR = DEOXYRIBOSE

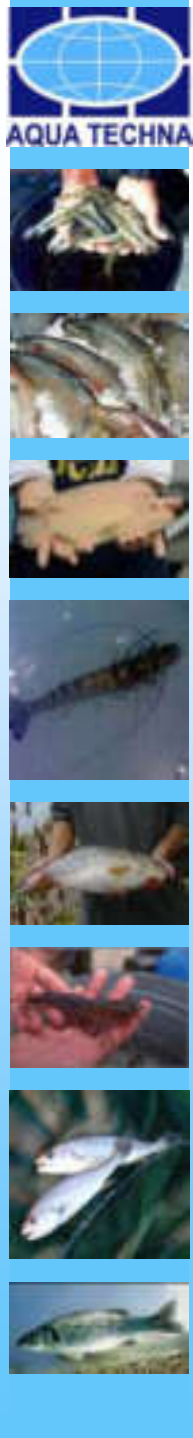
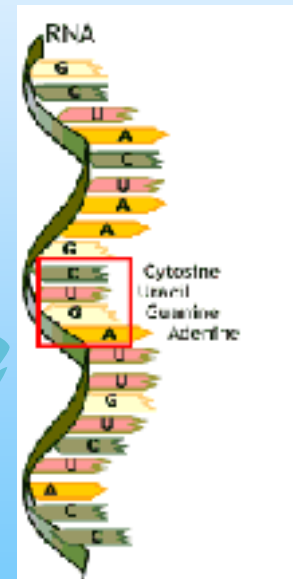
BASES = A G C T



RNA

PENTOSE SUGAR = RIBOSE

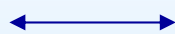
BASES = A G C U



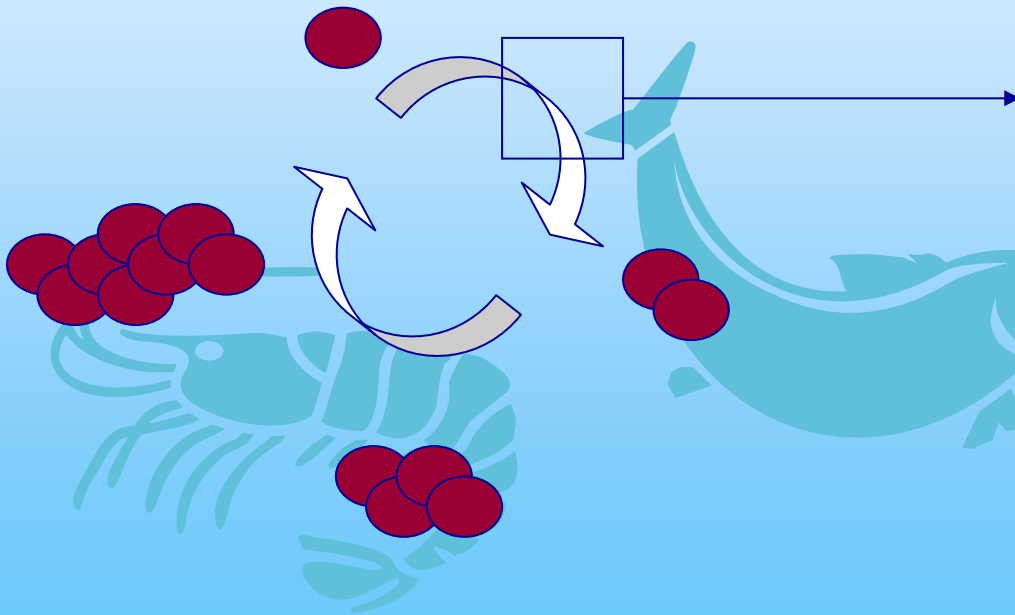
CELL MULTIPLICATION

PROCESS:

**CELL
MULTIPLICATION
PROCESS**



**DNA
REPLICATION**



MOTHER CELL

Parental
template

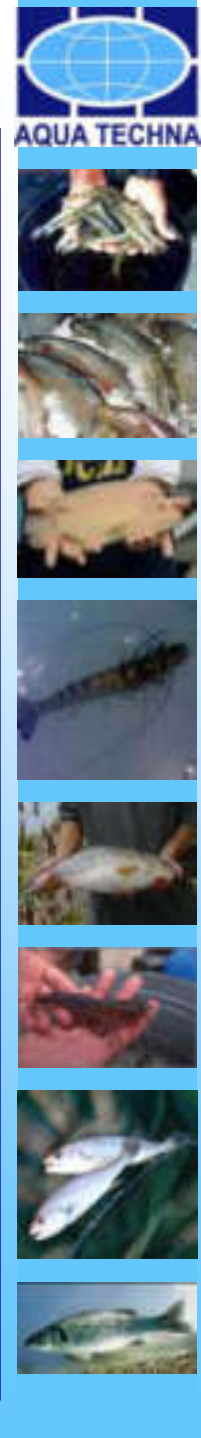
DNA
polymerase

↓ REPLICATION ↓

Daughter helixes



DAUGHTER CELLS



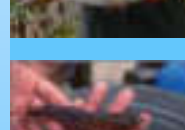
NUCLEOTIDES ROLE

- ⇒ NUCLEOTIDES ARE ESSENTIAL TO SUPPORT ALL BODY FUNCTIONS WITH DEFICIENCY A LIMITING FACTOR IN MANY KEY BODY FUNCTIONS (RAPIDLY MULTIPLYING CELLS OF THE IMMUNE SYSTEM, LIVER, INTESTINE)**
- ⇒ DIETS ARE DEFICIENT ESPECIALLY DURING PERIODS OF PEAK DEMAND.**
- ⇒ MANY OF THE REQUIREMENTS CANNOT BE SUPPLIED FULLY FROM INTERNAL SOURCES THROUGH THE NORMAL DIGESTION OF FOOD.**
- ⇒ DE NOVO SYNTHESIS IS HIGHLY ENERGY CONSUMING**



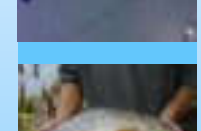
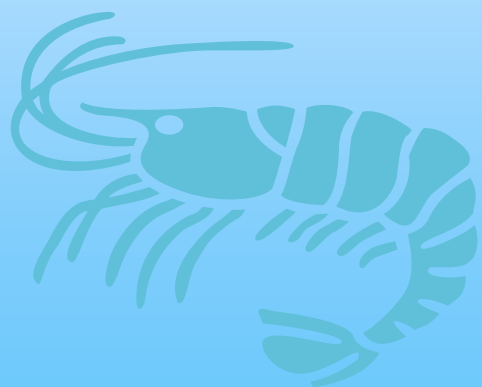
CONCLUSION ON THE NUCLEOTIDES ROLE

***NUCLEOTIDES
PROVIDE NATURAL BUILDING BLOCKS
FOR CELLULAR GROWTH AND
MULTIPLICATION,
AND FOR BIOSYNTHESIS OF PROTEINS
AND ENZYMES.***



NUCLEO 20

***TRIALS IN DIFFERENT FISH AND
CRUSTACEANS SPECIES CONFIRM
EFFICIENCY***



NUCLEO20

PURIFIED NUCLEOTIDES DIET RESULTS: EFFECT ON LENGHT DIGESTIVE VILLAE

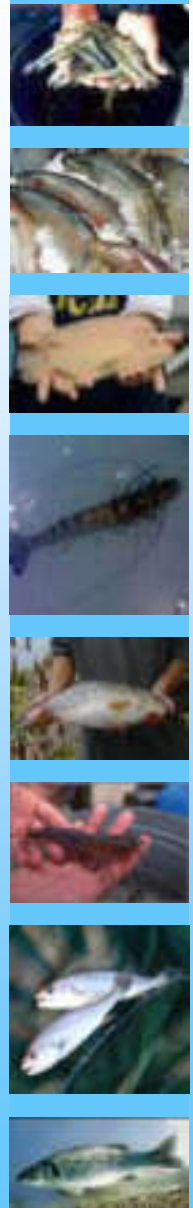
**FISH FED CONTROL DIET
(3 WEEKS)**



**FISH FED PURIFIED NUCLEOTIDE
DIET (3 WEEKS)**



DISTAL INTESTINE: MAGNIFICATION X 70: STAINED HAEMATOXYLIN AND EOSIN.



SHRIMPS: BENEFIT ON THE GROWTH RATE

NUCLEO20 IN THE DIET

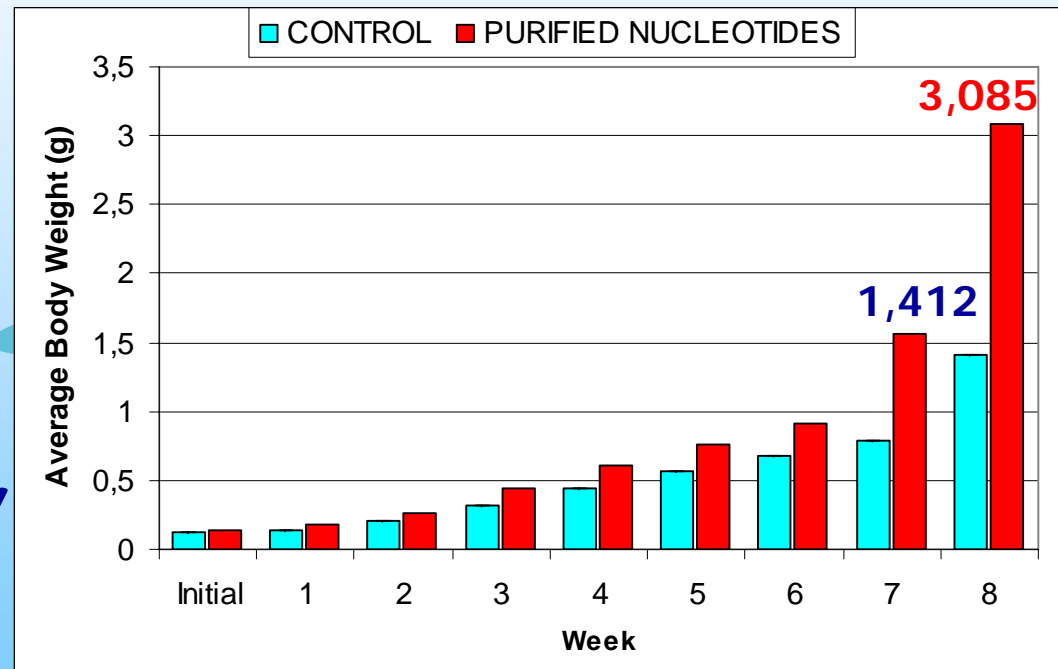
IMPROVES SIGNIFICANTLY ($P < 0,05$) THE WEEKLY AVERAGE WEIGHT:

- COMPARISON OF CONTROL GROUP VS. PURIFIED NUCLEOTIDE GROUP:

- PURIFIED NUCLEOTIDES @ 2KG/TON

- STRESSFUL CONDITIONS INDUCED BY A LOW SALINITY

- SAME MORTALITY LEVEL (19-20%)



Animals: *Penaeus vannamei*

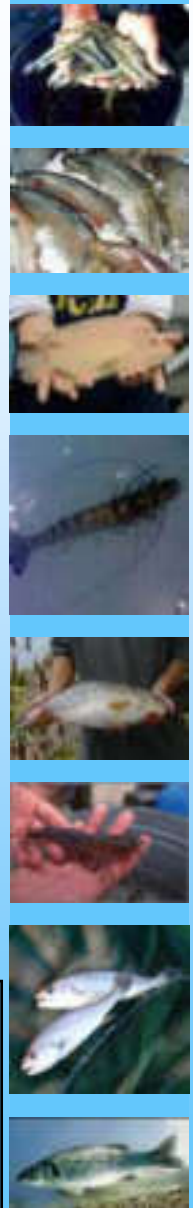
Tanks: 6 X 60L – Control Group (3) – Purified Nucleotide Group (3)

Salinity: 3 ppt

Diet: Zeigler Bros. USA (45% Crude Protein, 15% Crude Fat)

Duration of the trial: 8 weeks

(SOURCE LALLEMAND COURTESY)



NUCLEO20

SHRIMPS: BENEFIT ON THE GROWTH RATE & SURVIVAL

NUCLEO20 IN THE DIET

IMPROVES THE GROWTH (FINAL BODY WEIGHT) AND SURVIVAL:

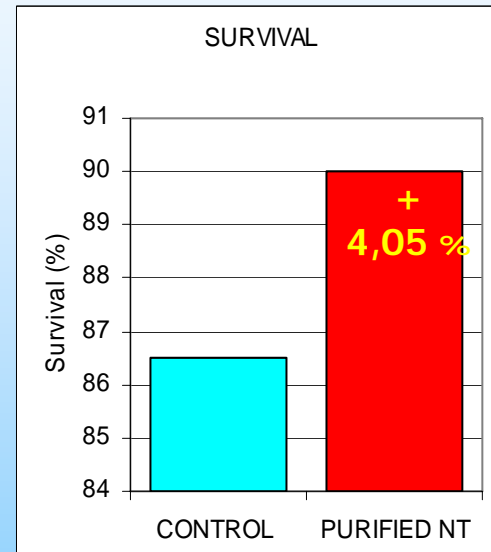
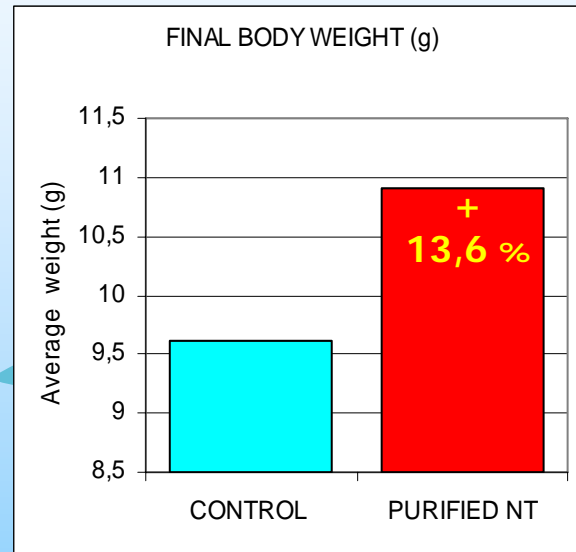
- COMPARISON OF CONTROL GROUP VS. PURIFIED NUCLEOTIDE GROUP AFTER 31 DAYS OF EXPERIMENT:

- PURIFIED NUCLEOTIDES @ 2KG/TON

- STRESSFUL CONDITIONS INDUCED BY A LOW SALINITY

- MORTALITIES RECORDED DAILY

- SAMPLE OF N=30 SHRIMPS/WEIGHT



Animals: juveniles *Penaeus vannamei*

(Initial BW 5,49 +/- 1,767)

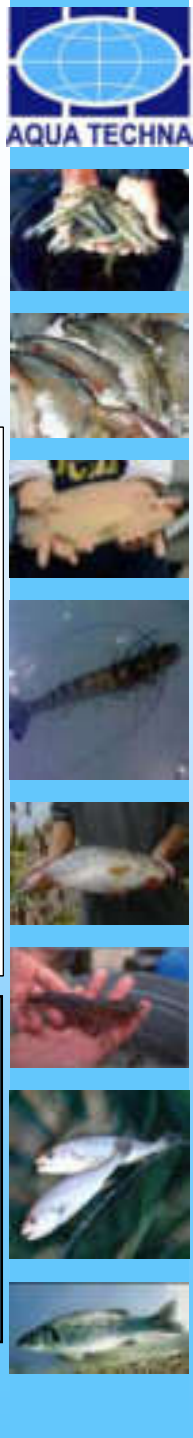
(115 PL /m3)

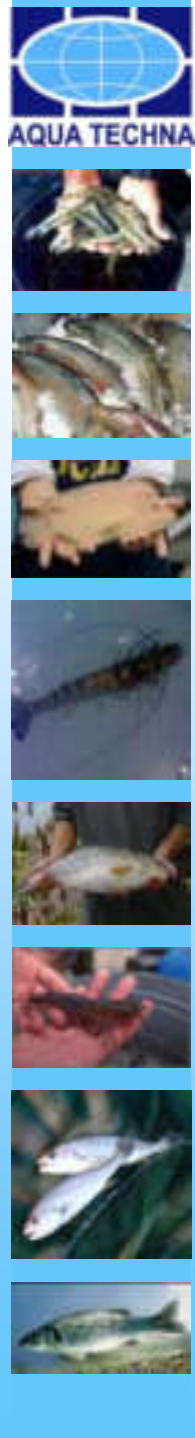
Tanks: 6 X 60L – Control Group (3) – Purified Nucleotide Group (3)

Salinity: 3 ppt

Diet: Zeigler Bros. USA (45% Crude Protein, 15% Crude Fat) Feeding 4X/Day

Duration of the trial: 31 DAYS





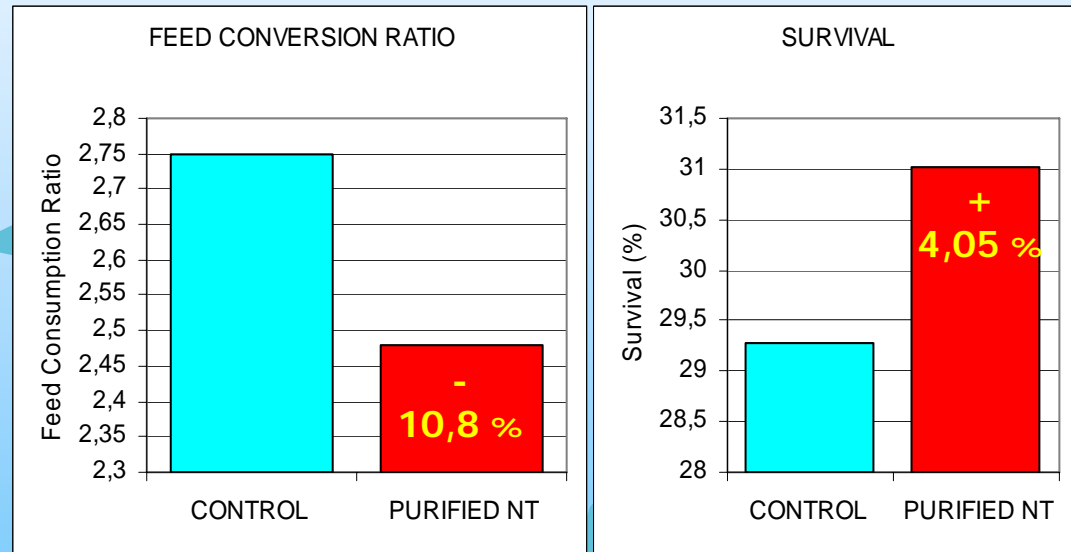
NUCLEO20 IN THE DIET :

SIGNIFICANT IMPROVEMENT OF SURVIVAL & FEED CONSUMPTION RATIO – FIELD TRIAL IN ECUADOR

- COMPARISON OF CONTROL PONDS VS. PURIFIED NUCLEOTIDE PONDS:

- PURIFIED NUCLEOTIDES @ 2KG/TON

- NO SIGNIFICANT DIFFERENCES IN GROWTH.



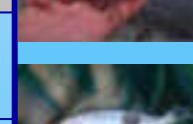
Animals: *Penaeus vannamei*

Ponds: 11 Control Group (6) – Purified Nucleotide Group (5)

Stocking Density: 170,000 shrimps/ ha

RESULTS FROM FIELD TRIALS IN THAILAND**(PROMCHAIWONG, 1995) WITH PURIFIED NUCLEOTIDES:**

Parameter	Unit	Control	NUCLEO 20	Change % (1)
TRIAL 1- Trial Period 110 Days				
FINAL WEIGHT	g	20	25	+25
FCR	1:	1,65	1,2	+27,3
SURVIVAL	%	70	80	+14,3
TRIAL2- Trial Period 87 days				
FINAL WEIGHT	G	12,5	15,4	+23,2
SURVIVAL	%	65	90	+38,5
(1) Control= 100				

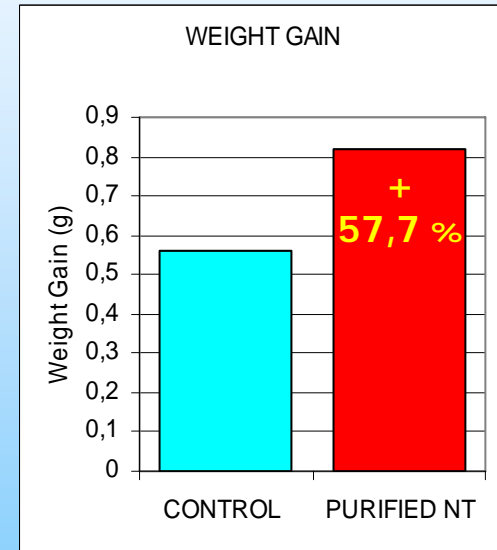
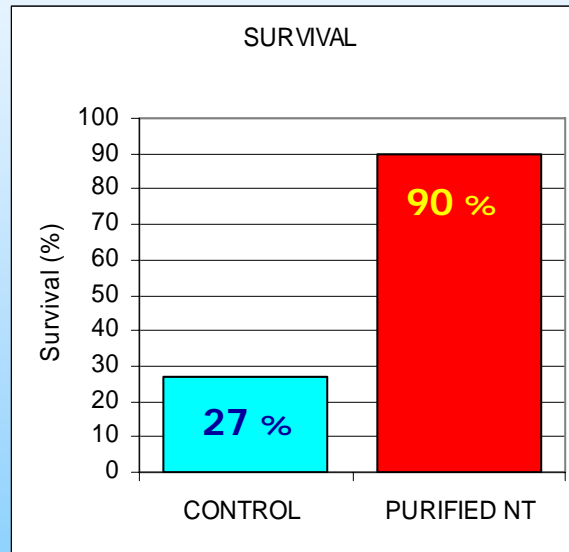


SHRIMP: BENEFIT ON THE DISEASE RESISTANCE:

NUCLEO20 IN THE DIET IMPROVES THE RESISTANCE OF SHRIMPS DURING AN EXPERIMENTAL INFECTION WITH WHITESPOT VIRUS (WSV)

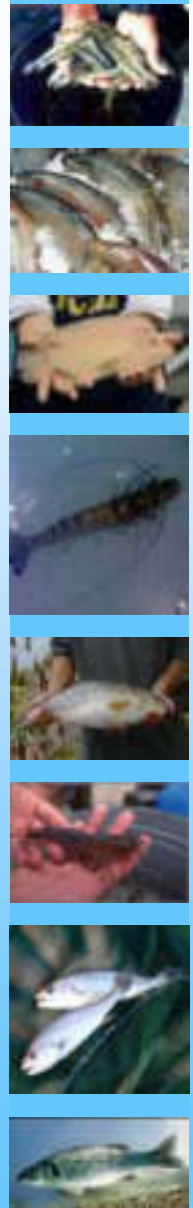
- **COMPARISON OF CONTROL GROUP VS. PURIFIED NUCLEOTIDE GROUP AFTER 24 DAYS OF EXPERIMENT:**

- **INFECTION: FROM DAY 5**
- **PURIFIED NUCLEOTIDES @ 2KG/TON**
- **MORTALITIES RECORDED DAILY**



Animals: juveniles *Penaeus vannamei* (Initial BW 0,97)
Tanks: 6 X 60L – Control Group (3) – Purified Nucleotide Group (3)
Stocking Density: 9,7 g/ tank
Salinity: 31 ppt
Feeding: 3X / DAY
Duration of the trial: 24 DAYS
Infection: 5th day of test with infected animals

(SOURCE LALLEMAND COURTESY)



NUCLEO20

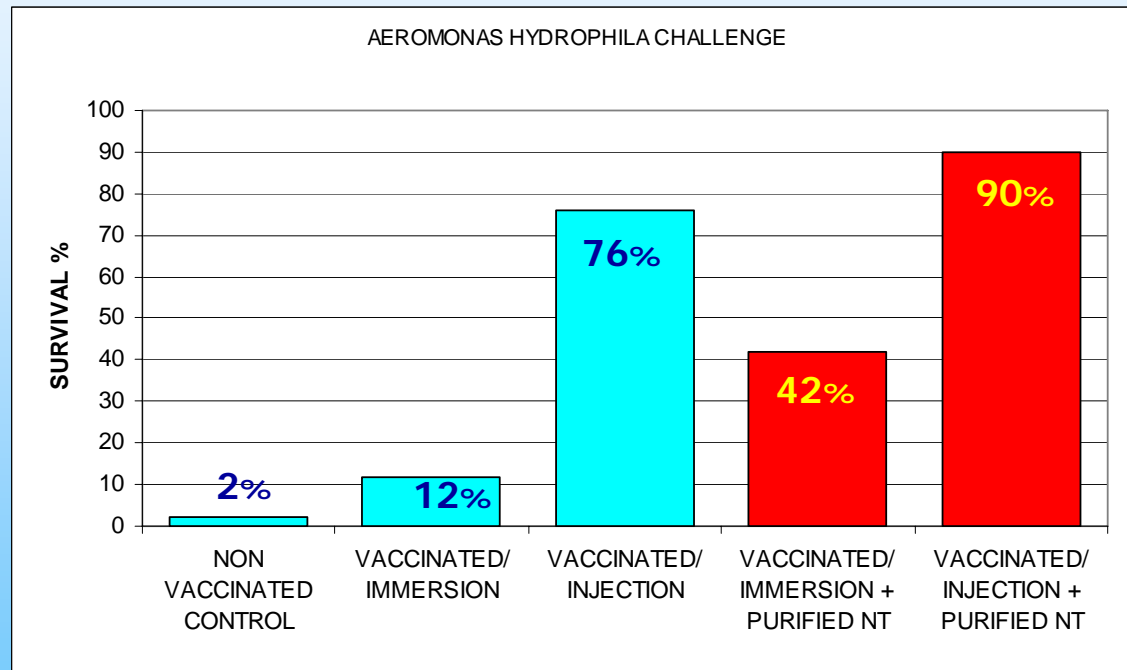
TILAPIA: BENEFIT ON THE IMMUNE RESPONSE



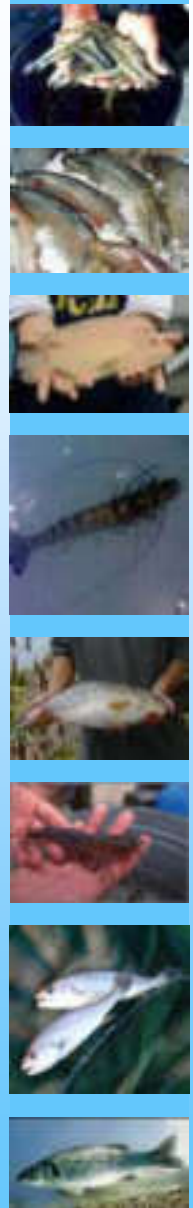
NUCLEO20 IN THE DIET IMPROVE THE IMMUNE RESPONSE OF TILAPIA AFTER VACCINATION & REDUCE SIGNIFICANTLY THE MORTALITY TO *AEROMONAS HYDROPHILA* CHALLENGE.

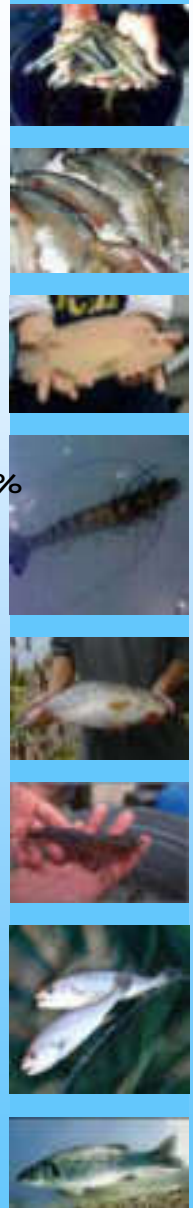
- COMPARISON OF THE SURVIVAL OF CONTROL GROUP VS. PURIFIED NUCLEOTIDE GROUP AFTER 84 DAYS OF EXPERIMENT:

- PURIFIED NUCLEOTIDES @ 2KG/TON
-MORTALITIES RECORDED DAILY



Animals: juveniles *Tilapia (Oreochromis hybrids)* N=50 / Group
Duration: 84 DAYS
VACCINATION: by Immersion or Intramuscular Injection
CHALLENGE: Infection with virulent strain of *Aeromonas hydrophila*



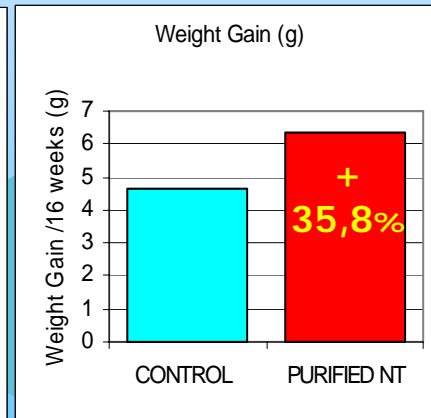
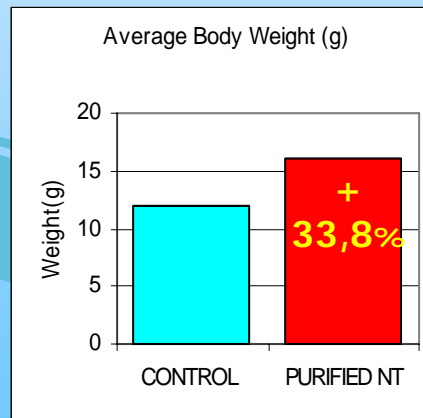
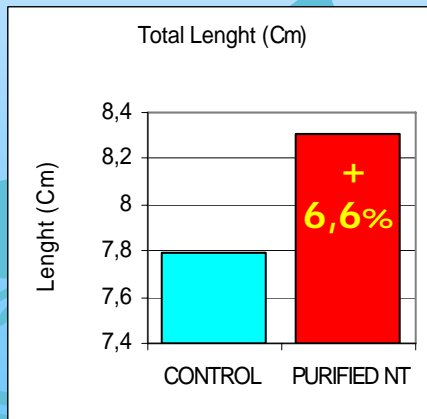
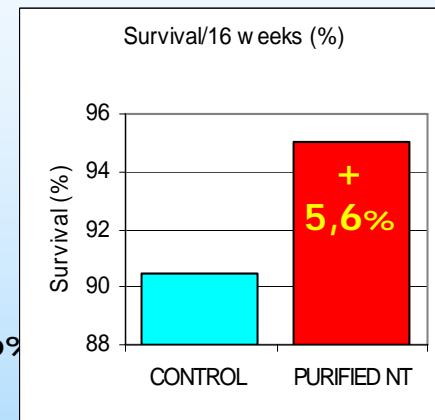
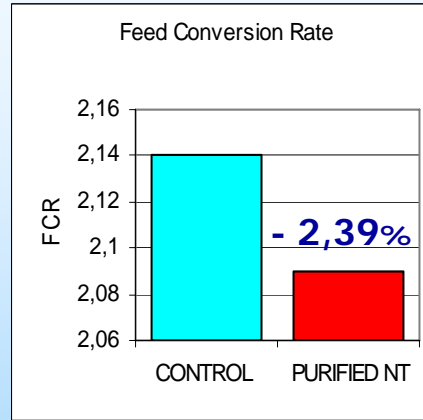


NUCLEO20 IN THE DIET IMPROVE:

THE FCR, SURVIVAL & THE GROWTH PARAMETERS OF TILAPIA:

- COMPARISON OF CONTROL GROUP VS. PURIFIED NUCLEOTIDE GROUP AFTER 16 WEEKS OF EXPERIMENT:

- PURIFIED NUCLEOTIDES @ 2KG/TON
- SURVIVAL & GROWTH PARAMETERS MEASURED WEEKLY.



Animals: juveniles *Tilapia (Oreochromis hybrids)* N=50 / Group

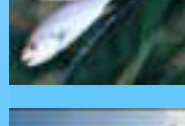
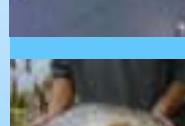
Duration: 16 WEEKS

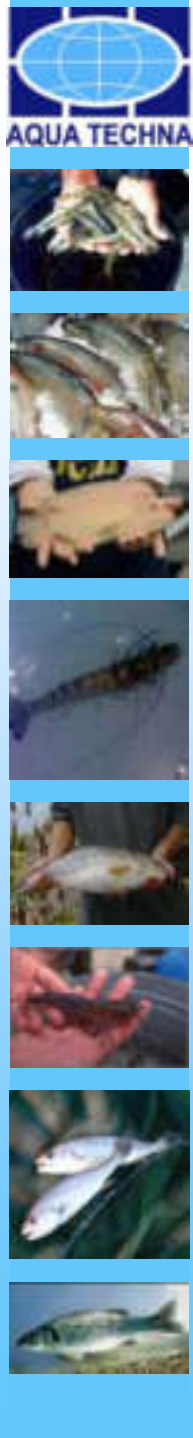
(SOURCE LALLEMAND COURTESY)

CONCLUSION OF TRIALS RESULTS

NUCLEO20

- ⇒ HELPS IMPROVE THE DISEASES RESISTANCE , GROWTH AND THE VACCINATION.**
- ⇒ EFFECTIVENESS OF AQUACULTURE SPECIES**
- ⇒ AS WELL AS HELPING TO REDUCE THE NEGATIVE EFFECT OF STRESS.**
- ⇒ AS A RESULT, IT PROMOTES BETTER GROWTH AND SURVIVAL THROUGHOUT THE PRODUCTION CYCLE.**



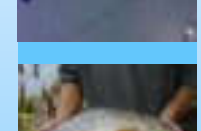


NUCLEO 20

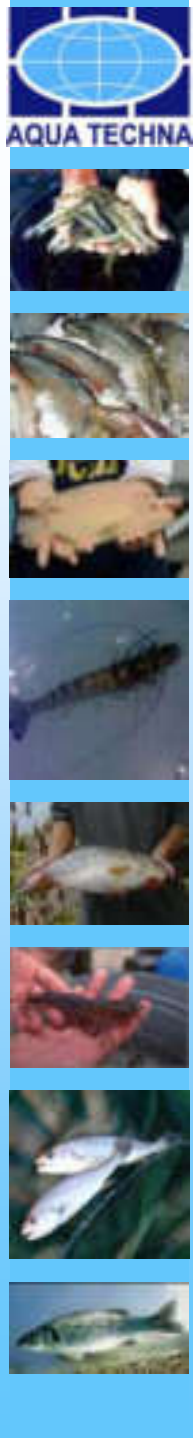
NUCLEO20 INCLUSION IN AQUACULTURE DIETS



NUCLEO20 INCLUSION IN AQUACULTURE DIETS



- ⇒ **NUCLEO20** HAS BEEN FORMULATED TO INSURE OPTIMAL FLOW WITHIN THE INDUSTRIAL PROCESS AND A HOMOGENEOUS INCORPORATION INTO PREMIXES
- ⇒ **NUCLEO20** IS STABLE IN ALL TYPES OF ANIMAL FEED: FLOUR, PELLETS OR LIQUIDS.
- ⇒ **NUCLEO20** HAS BEEN FORMULATED TO BE STABLE THROUGH EXTRUDERS AT HIGH PELLETIZATION TEMPERATURE (<140°C)
- ⇒ **NUCLEO20** CAN BE STORED 18 MONTHS AFTER THE MANUFACTURING DATE IN A COOL, DRY PLACE.



NUCLEO20 INCLUSION IN AQUACULTURE DIETS

- ⇒ **NUCLEO20** IS A TOTALLY NON TOXIC FEED INGREDIENT. IT LEAVES NO RESIDUES.
- ⇒ THERE IS NO REQUIREMENT FOR WITHDRAWAL PERIOD WHEN USING **NUCLEO20**
- ⇒ **NUCLEO20** IS COMPATIBLE WITH ALL FEED INGREDIENTS AND FEED ADDITIVES USUALLY USED IN THE MANUFACTURE OF FEEDING STUFFS.

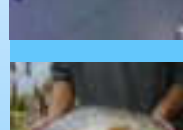
⇒ FISH

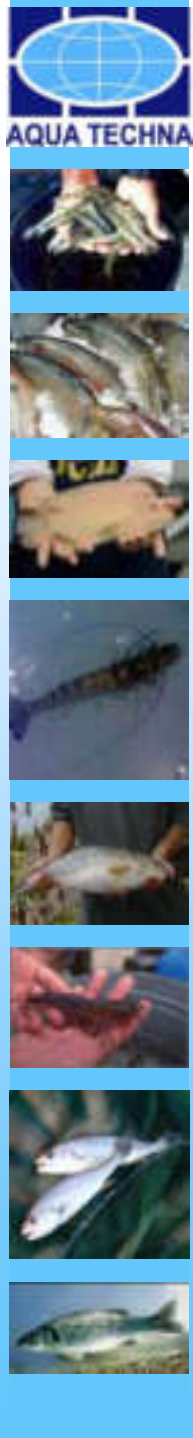
- ✓ **STARTER PHASE: 2KG / TON**
- ✓ **GROW OUT: 1KG / TON**

⇒ CRUSTACEANS

- ✓ **STARTER PHASE: 2KG / TON**
- ✓ **GROW OUT: 2KG / TON**

⇒ FOR DIFFERENT SITUATIONS (HIGH CHALLENGE DISEASES & DIFFERENT FARMING CONDITIONS) SEEK ADVICE.





NUCLEO 20

⇒ IS A NATURAL SOURCE OF PURIFIED NUCLEOTIDES SPECIFICALLY FORMULATED FOR AQUACULTURE APPLICATIONS.

⇒ IMPROVES SIGNIFICANTLY

✓ GROWTH PARAMETERS,

✓ DISEASE RESISTANCE,

✓ VACCINATION EFFECTIVENESS OF AQUACULTURE SPECIES