**Supplementary Table 1**. Biochemical characteristics of *A. veronii* DFR01 using API 20E

|  |  |  |
| --- | --- | --- |
| **Characteristics** | **Reaction** | **Remarks** |
| ONPG | Positive | Test for β-galactosidase enzyme by hydrolysis of the substrate o-nitrophenyl-b-D-galactopyranoside |
| ADH | Positive | Decarboxylation of the amino acid arginine by arginine dihydrolase |
| LDC | Positive | Decarboxylation of the amino acid lysine by lysine decarboxylase |
| ODC | Negative | Decarboxylation of the amino acid ornithine by ornithine decarboxylase |
| Citrate | Positive | Utilization of citrate as only carbon source |
| H2S | Negative | Production of hydrogen sulfide |
| Urea | Negative | Test for the enzyme urease |
| TDA | Negative | Tryptophan deaminase: detection of the enzyme tryptophan deaminase:  Reagent - Ferric Chloride. |
| Ind | Positive | Indole Test-production of indole from tryptophan by the enzyme tryptophanase. Reagent - Indole is detected by addition of Kovac’s reagent. |
| VP | Positive | The Voges-Proskauer test for the detection of acetoin (acetyl methyl carbinol) produced by fermentation of glucose by bacteria utilizing the butylene glycol pathway |
| Gel | Positive | Test for the production of the enzyme gelatinase which liquefies gelatin |
| GLU | Positive | Fermentation of glucose (hexose sugar) |
| MAN | Negative | Fermentation of mannose (hexose sugar) |
| INO | Negative | Fermentation of inositol (cyclic polyalcohol) |
| SOR | Negative | Fermentation of sorbitol (alcohol sugar) |
| RHA | Negative | Fermentation of rhamnose (methyl pentose sugar) |
| SAC | Positive | Fermentation of sucrose (disaccharide) |
| MEL | Negative | Fermentation of melibiose (disaccharide) |
| AMY | Negative | Fermentation of amygdalin (glycoside) |
| ARA | Negative | Fermentation of arabinose (pentose sugar) |

**Supplementary Table 2**. Biochemical characteristics of *A. veronii* DFR01 using API 20 NE

|  |  |  |
| --- | --- | --- |
| **Characteristics** | **Reaction** | **Remarks** |
| NO3 | Positive | Reduction of nitrates to nitrites |
| TRP | Positive | Indole production |
| GLU | Positive | Fermentation glucose |
| ADH | Positive | Arginine dihydrolase |
| URE | Negative | Urease |
| ESC | Negative | Hydrolysis ( β-glucosidase) |
| GEL | Positive | Hydrolysis (protease) |
| PNPG | Positive | β-galactosidase (Para-NitroPhenyl-ß D-Galactopyranosidase) |
| GLU | Positive - Opaquea | Assimilation (GLUcose) |
| ARA | Negative - Transparentb | Assimilation (ARAbinose) |
| MNE | Positive - Opaque | Assimilation (ManNosE) |
| MAN | Positive - Opaque | Assimilation (MANnitol) |
| NAG | Positive - Opaque | Assimilation (N-Acetyl-Glucosamine) |
| MAL | Positive - Opaque | Assimilation (MALtose) |
| GNT | Positive - Opaque | Assimilation (potassium GlucoNate) |
| CAP | Positive - Opaque | Assimilation (CAPric acid) |
| ADI | Negative - Transparent | Assimilation (ADIpic acid) |
| MLT | Positive - Opaque | Assimilation (MaLaTe) |
| CIT | Positive - Opaque | Assimilation (trisodium CITrate) |
| PAC | Negative - Transparent | Assimilation (PhenylACetic acid) |
| OX | Positive | Oxidase |

a Positive , growth of organism

b No Growth of organism

**Supplementary Table 3**. Characteristics of *A. veronii* DFR01 in Biolog Gen III

|  |  |  |
| --- | --- | --- |
| **Substrate** | **Phenotypic characteristics** | ***A. veronii* DFR01** |
| A1 Negative Control | - |
| Sugars | A2 Dextrin | + |
| A3 D-Maltose | + |
| A4 D-Trehalose | + |
| A5 D-Cellobiose | +/- |
| A6 Gentiobiose | - |
| A7 Sucrose | + |
| A8 D-Turanose | +/- |
| A9 Stachyose | - |
|  | A10 Positive Control | + |
| pH | A11 pH 6 | + |
| A12 pH 5 | + |
| Sugars | B1 D-Raffinose | + |
| B2 α-D-Lactose | +/- |
| B3 D-Melibiose | - |
| B4 β-Methyl-D-Glucoside | + |
| B5 D-Salicin | + |
| B6 N-Acetyl-D-Glucosamine | + |
| B7 N-Acetyl-β-D-Mannosamine | + |
| B8 N-Acetyl-D-Galactosamine | - |
| B9 N-Acetyl Neuraminic Acid | - |
| NaCl | B10 1% NaCl | + |
| B11 4% NaCl | - |
| B12 8% NaCl | - |
| Sugars | C1 α-D-Glucose | + |
| C2 D-Mannose | + |
| C3 D-Fructose | + |
| C4 D-Galactose | + |
| C5 3-Methyl Glucose | +/- |
| C6 D-Fucose | + |
| C7 L-Fucose | + |
| C8 L-Rhamnose | - |
| C9 Inosine | + |
| Lactic Acid | C10 1% Sodium Lactate | + |
| Antibiotic | C11 Fusidic Acid | - |
|  | C12 D-Serine | + |
| Polyvalent alcohols | D1 D-Sorbitol | +/- |
| D2 D-Mannitol | + |
| D3 D-Arabitol | + |
| D4 myo-Inositol | +/- |
| D5 Glycerol | + |
| Hexose-PO4’s | D6 D-Glucose- 6-PO4 | + |
| D7 D-Fructose- 6-PO4 | + |
| Amino Acids | D8 D-Aspartic Acid | - |
| D9 D-Serine | + |
| Antibiotics | D10 Troleandomycin | + |
| D11 Rifamycin SV | + |
| D12 Minocycline | - |
| Amino Acids | E1 Gelatin | + |
| E2 Glycyl-L-Proline | + |
| E3 L-Alanine | + |
| E4 L-Arginine | + |
| E5 L-Aspartic Acid | + |
| E6 L-Glutamic Acid | + |
| E7 L-Histidine | + |
| E8 L-Pyroglutamic Acid | - |
| E9 L-Serine | + |
| Antibiotic | E10 Lincomycin | - |
|  | E11 Guanidine HCl | + |
|  | E12 Niaproof 4 | + |
| Hexose acids | F1 Pectin | + |
| F2 D-Galacturonic Acid | - |
| F3 L-Galactonic Acid Lactone | - |
| F4 D-Gluconic Acid | + |
| F5 D-Glucuronic Acid | - |
| F6 Glucuronamide | - |
| F7 Mucic Acid | - |
| F8 Quinic Acid | - |
| F9 D-Saccharic Acid | - |
| GN/GP | F10 Vancomycin | + |
| Reducing power | F11 Tetrazolium Violet | + |
| F12 Tetrazolium Blue | + |
| Carboxylic acids, esters, and fatty acids | G1 p-Hydroxy- Phenylacetic Acid | - |
| G2 Methyl Pyruvate | + |
| G3 D-Lactic Acid Methyl Ester | - |
| G4 L-Lactic Acid | - |
| G5 Citric Acid | + |
| G6 α-Keto-Glutaric Acid | - |
| G7 D-Malic Acid | - |
| G8 L-Malic Acid | + |
| G9 Bromo-Succinic Acid | +/- |
| GN/GP | G10 Nalidixic Acid | - |
|  | G11 Lithium Chloride | - |
|  | G12 Potassium Tellurite | - |
| Carboxylic acids, esters, and fatty acids | H1 Tween 40 | + |
| H2 γ-Amino-Butryric Acid | - |
| H3 α-Hydroxy Butyric Acid | - |
| H4 β-Hydroxy-D,L Butyric Acid | + |
| H5 α-Keto-Butyric Acid | + |
| H6 Acetoacetic Acid | +/- |
| H7 Propionic Acid | + |
| H8 Acetic Acid | + |
| H9 Formic Acid | + |
| Antibiotic | H10 Aztreonam | - |
|  | H11 Sodium Butyrate | + |
|  | H12 Sodium Bromate | - |

**Supplementary Table 4**. MALDI-TOF scores of the *Aeromonas* DFR01 isolated from a diseased fish (*O. niloticus*) from Binangonan, Rizal.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Spot** | **Sample ID** | **Organism** | **Info** | **Score** |
| A1 | CAL\_1 | *Escherichia coli* | Calibrator | 2.10 |
| A1 | CAL\_1 | *Escherichia coli* | Calibrator | 2.12 |
| A1 | DS\_01 | *Escherichia coli* | Calibrator | 2.14 |
| A2 | CAL\_2 | *Escherichia coli* | Calibrator | 2.10 |
| A3 | CAL\_3 | *Escherichia coli* | Calibrator | 1.72 |
| A4 | MAT\_1 | (Matrix) | Unreliable\* | 1.33 |
| A5 | MAT\_2 | (Matrix) | Unreliable | 1.23 |
| A6 | MAT\_3 | (Matrix) | Unreliable | 1.20 |
| D10 | S15\_1 | *Aeromonas veronii* |  | 2.41 |
| D11 | S15\_2 | *Aeromonas veronii* |  | 2.12 |
| D12 | S15\_3 | *Aeromonas veronii* |  | 2.41 |
| E1 | S16\_1 | *Aeromonas veronii* |  | 2.13 |
| E2 | S16\_2 | *Aeromonas veronii* |  | 2.42 |
| E3 | S16\_3 | *Aeromonas veronii* |  | 2.38 |
|  |  |  |  |  |

\*Blank

**Supplementary Table 5.** Inoculum dose, cumulative mortality and re-isolation rate of *A. veronii* DFR01 of experimentally infected *O. niloticus* juveniles (ABW: 6 g, n=20 fish/inoculum dose)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Inoculum dose** | **Cumulative mortality (%)** | **Fish examined** | **Number** | **Reisolation (kidney) rate (%)** |
|  |  |  |  |  |
| 109.8 CFU fish-1 | 19/20  (95) | Dead | 19 | 19/19 (100) |
| Surviving | 1 | 1/1 (100) |
| 108.8 CFU fish-1 | 15/20  (75) | Dead | 15 | 15/15 (100) |
| Surviving | 5 | 5/5 (100) |
| 107.8 CFU fish-1 | 13/20  (65) | Dead | 7 | 7/7 (100) |
| Surviving | 13 | 12/13 (92) |
| 106.8 CFU fish-1 | 4/20  (20) | Dead | 4 | 4/4 (100) |
| Surviving | 16 | 13/16 (81) |
| 105.8 CFU fish-1 | 2/20  (10) | Dead | 2 | 2/2 (100) |
| Surviving | 18 | 12/18 (67) |
| Control | 0/20  (0) | Surviving | 10 | 0/10 (0) |
|  |  |  |  |  |

**Supplementary Table 6.** Mortality rate, relative percent survival (RPS) and bacterial re-isolation data from *A. veronii* DFR01-challenged tilapia at different treatments: clay, vaccine and control in two replicates

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Replicate** | **Fish Group** | **No. Fish Dead/Examined** | **Mortality (%)** | **x2 - test** | **P-value** | **Relative Percent Survival (RPS)** | **No. of Fish (+) Bacterial Re-isolation/Examined** | |
| **Dead Fish** | **Survivor** |
|  |  |  |  |  |  |  |  |  |
| 1 | Clay | 9/20 | 45 | 3.137 | 0.077ns | 40 | 9/9 | 4/11 |
| Vaccine | 5/20 | 25 | 8.100 | 0.004\*\* | 67 | 5/5 | 1/15 |
| Control (challenged) | 15/20 | 75 |  |  | 0 | 15/15 | 2/5 |
| Control (NSS-mock challenged) | 0/20 | 0 |  |  | 100 | - | 0/20 |
|  |  |  |  |  |  |  |  |  |
| 2 | Clay | 8/20 | 40 | 3.683 | 0.055ns | 47 | 8/8 | 1/12 |
|  | Vaccine | 7/20 | 35 | 4.949 | 0.026\* | 53 | 7/7 | 0/13 |
|  | Control (challenged) | 15/20 | 75 |  |  | 0 | 15/15 | 0/5 |
|  | Control (NSS-mock challenged) | 0/20 | 0 |  |  | 100 | - | 0/20 |
|  |  |  |  |  |  |  |  |  |

**Supplementary Table 7.** Blood chemistry values for vaccinated and non-vaccinated *O. niloticus*

