

Optimization of conditions for feather waste biodegradation by geophilic *Trichophyton ajelloi* fungal strains towards further agricultural use

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Table S1. Dynamics of changes in enzymatic activity and the secretion of organic and mineral products of chicken feathers keratinolysis by *Trichophyton ajelloi* strains with the addition of various carbon sources to the culture medium.

Days	7	14	21	28	35	Mean
Protease [$\mu\text{g tyrosine cm}^{-3}$]						
F (III)	48.15 \pm 3.90 ^a	58.87 \pm 3.26 ^b	40.24 \pm 0.55 ^a	59.02 \pm 3.99 ^b	70.56 \pm 1.27 ^c	55.37 \pm 2.59
F (XII)	44.82 \pm 1.09 ^{ac}	47.56 \pm 2.08 ^a	37.57 \pm 1.64 ^b	40.01 \pm 1.27 ^{bc}	49.41 \pm 2.16 ^a	43.88 \pm 1.65
F (XIV)	49.04 \pm 2.54 ^c	38.09 \pm 3.02 ^{ab}	32.84 \pm 0.79 ^a	33.14 \pm 3.26 ^a	42.16 \pm 1.57 ^{bc}	39.05 \pm 2.24
F+G (III)	16.86 \pm 2.20 ^c	82.25 \pm 11.05 ^{ab}	92.08 \pm 5.28 ^b	68.05 \pm 3.71 ^a	73.74 \pm 2.73 ^{ab}	66.60 \pm 4.99
F+G (XII)	21.75 \pm 1.48 ^c	99.26 \pm 3.73 ^a	98.08 \pm 8.01 ^a	83.21 \pm 1.92 ^b	92.75 \pm 3.18 ^{ab}	79.01 \pm 3.66
F+G (XIV)	31.73 \pm 7.42 ^a	107.54 \pm 16.58 ^b	93.86 \pm 10.27 ^b	59.39 \pm 5.50 ^a	59.91 \pm 4.45 ^a	70.49 \pm 8.84
F+X (III)	16.79 \pm 2.24 ^c	41.94 \pm 6.71 ^{ab}	42.16 \pm 8.18 ^{ab}	36.46 \pm 0.82 ^a	56.95 \pm 4.96 ^b	38.86 \pm 4.58
F+X (XII)	13.68 \pm 1.45 ^b	38.39 \pm 3.99 ^a	34.91 \pm 2.73 ^a	45.27 \pm 9.55 ^a	74.70 \pm 3.63 ^c	41.39 \pm 4.27
F+X (XIV)	15.24 \pm 1.09 ^b	38.09 \pm 4.12 ^{ab}	45.86 \pm 17.49 ^{ab}	50.81 \pm 8.34 ^a	67.38 \pm 12.89 ^a	43.48 \pm 8.79
Keratinase [KU cm^{-3}]						
F (III)	54.77 \pm 1.68 ^b	79.57 \pm 1.75 ^a	81.03 \pm 1.54 ^a	80.73 \pm 2.78 ^a	93.70 \pm 1.69 ^c	77.96 \pm 1.89
F (XII)	40.23 \pm 2.05 ^a	38.53 \pm 1.55 ^a	48.40 \pm 2.27 ^b	44.30 \pm 2.60 ^{ab}	56.97 \pm 1.62 ^c	45.69 \pm 2.02
F (XIV)	39.67 \pm 2.48 ^a	42.87 \pm 1.02 ^{ab}	49.13 \pm 2.52 ^{bc}	50.27 \pm 1.62 ^c	56.80 \pm 1.39 ^d	47.75 \pm 1.81
F+G (III)	49.90 \pm 3.19 ^c	79.23 \pm 5.39 ^d	111.43 \pm 7.84 ^{ab}	110.63 \pm 6.37 ^a	129.73 \pm 4.34 ^b	96.19 \pm 5.43
F+G (XII)	37.10 \pm 6.08 ^b	57.80 \pm 6.37 ^c	86.00 \pm 7.08 ^a	78.13 \pm 3.33 ^a	109.71 \pm 1.88 ^d	73.75 \pm 4.95
F+G (XIV)	38.80 \pm 4.46 ^b	45.87 \pm 6.18 ^b	95.23 \pm 7.11 ^a	103.93 \pm 2.95 ^a	108.60 \pm 3.41 ^a	78.49 \pm 4.82
F+X (III)	51.30 \pm 3.12 ^a	42.97 \pm 3.61 ^a	68.23 \pm 6.59 ^b	55.40 \pm 2.91 ^{ab}	92.13 \pm 5.49 ^c	62.01 \pm 4.35
F+X (XII)	42.23 \pm 1.65 ^a	41.40 \pm 1.82 ^a	54.93 \pm 5.83 ^b	51.97 \pm 1.54 ^{ab}	92.33 \pm 4.32 ^c	56.57 \pm 3.03
F+X (XIV)	37.57 \pm 5.72 ^b	65.87 \pm 8.58 ^a	62.63 \pm 3.87 ^a	54.80 \pm 4.03 ^{ab}	97.70 \pm 6.65 ^c	63.71 \pm 5.77
Disulfide reductase [U cm^{-3}]						
F (III)	0.010 \pm 0.001 ^a	0.013 \pm 0.005 ^a	0.013 \pm 0.005 ^a	0.019 \pm 0.008 ^{ab}	0.032 \pm 0.005 ^b	0.017 \pm 0.004
F (XII)	0.194 \pm 0.008 ^{ab}	0.188 \pm 0.012 ^a	0.223 \pm 0.008 ^{bc}	0.207 \pm 0.012 ^{ab}	0.256 \pm 0.012 ^c	0.214 \pm 0.010
F (XIV)	0.013 \pm 0.005 ^a	0.036 \pm 0.009 ^b	0.019 \pm 0.008 ^{ab}	0.026 \pm 0.005 ^{ab}	0.084 \pm 0.005 ^c	0.036 \pm 0.006
F+G (III)	0.052 \pm 0.005 ^c	0.013 \pm 0.005 ^a	0.013 \pm 0.005 ^a	0.032 \pm 0.005 ^b	0.026 \pm 0.005 ^{ab}	0.027 \pm 0.005
F+G (XII)	0.032 \pm 0.005 ^{ab}	0.013 \pm 0.005 ^a	0.019 \pm 0.008 ^{ab}	0.016 \pm 0.005 ^a	0.039 \pm 0.008 ^b	0.024 \pm 0.006
F+G (XIV)	0.068 \pm 0.008 ^b	0.091 \pm 0.012 ^b	0.010 \pm 0.001 ^c	0.036 \pm 0.005 ^a	0.036 \pm 0.005 ^a	0.048 \pm 0.006
F+X (III)	0.207 \pm 0.012 ^c	0.032 \pm 0.012 ^a	0.142 \pm 0.017 ^b	0.013 \pm 0.005 ^a	0.049 \pm 0.016 ^a	0.089 \pm 0.012
F+X (XII)	0.136 \pm 0.008 ^b	0.010 \pm 0.001 ^a	0.013 \pm 0.005 ^a	0.013 \pm 0.005 ^a	0.010 \pm 0.001 ^a	0.036 \pm 0.003
F+X (XIV)	0.029 \pm 0.008 ^a	0.013 \pm 0.005 ^a	0.058 \pm 0.008 ^b	0.026 \pm 0.005 ^a	0.013 \pm 0.005 ^a	0.028 \pm 0.006
Proteins and peptides [$\mu\text{g of proteins cm}^{-3}$]						
F (III)	297.42 \pm 5.44 ^b	473.18 \pm 7.52 ^a	473.37 \pm 6.33 ^a	509.37 \pm 7.35 ^c	545.95 \pm 19.68 ^d	459.86 \pm 9.26
F (XII)	341.12 \pm 20.62 ^b	421.78 \pm 14.01 ^a	387.32 \pm 9.27 ^{ab}	394.06 \pm 14.68 ^a	430.25 \pm 15.16 ^a	394.91 \pm 14.75
F (XIV)	308.40 \pm 7.41 ^d	394.06 \pm 1.91 ^{bc}	365.19 \pm 2.37 ^a	378.85 \pm 6.48 ^{ab}	413.12 \pm 10.90 ^c	371.92 \pm 5.81
F+G (III)	756.55 \pm 13.59 ^a	498.78 \pm 46.63 ^b	720.17 \pm 25.67 ^a	692.25 \pm 19.61 ^a	716.51 \pm 23.49 ^a	676.85 \pm 25.80
F+G (XII)	775.80 \pm 7.22 ^e	471.64 \pm 12.43 ^a	619.49 \pm 5.70 ^b	677.43 \pm 2.63 ^c	724.79 \pm 8.66 ^d	653.83 \pm 7.33
F+G (XIV)	790.82 \pm 11.59 ^d	435.84 \pm 17.91 ^c	624.68 \pm 31.34 ^a	665.88 \pm 25.78 ^{ab}	705.92 \pm 23.98 ^b	644.63 \pm 22.12
F+X (III)	934.62 \pm 31.39 ^b	1227.62 \pm 39.60 ^a	1299.81 \pm 17.49 ^a	1217.22 \pm 29.43 ^a	1283.63 \pm 22.80 ^a	1192.58 \pm 28.14
F+X (XII)	933.46 \pm 26.93 ^c	1253.80 \pm 13.59 ^{ab}	1213.95 \pm 39.76 ^{ab}	1189.11 \pm 25.39 ^a	1288.83 \pm 33.92 ^b	1175.83 \pm 27.92
F+X (XIV)	932.12 \pm 26.29 ^b	968.89 \pm 46.82 ^b	1092.09 \pm 39.24 ^a	1118.46 \pm 33.59 ^a	1192.96 \pm 32.80 ^a	1060.90 \pm 35.75
Amino groups [$\mu\text{g N-NH}_2 \text{ cm}^{-3}$]						
F (III)	5.78 \pm 0.43 ^a	10.62 \pm 0.23 ^b	10.34 \pm 0.30 ^b	6.16 \pm 0.33 ^a	6.61 \pm 0.19 ^a	7.90 \pm 0.30
F (XII)	7.02 \pm 0.16 ^b	10.89 \pm 0.15 ^c	11.98 \pm 0.31 ^a	12.57 \pm 0.34 ^a	14.46 \pm 0.33 ^d	11.38 \pm 0.26
F (XIV)	5.37 \pm 0.31 ^b	8.32 \pm 0.24 ^a	9.15 \pm 0.28 ^a	7.32 \pm 0.17 ^c	8.42 \pm 0.32 ^a	7.72 \pm 0.26
F+G (III)	2.07 \pm 0.01 ^b	11.09 \pm 0.24 ^c	21.02 \pm 0.60 ^d	24.60 \pm 0.99 ^a	24.55 \pm 0.77 ^a	16.67 \pm 0.52
F+G (XII)	2.14 \pm 0.52 ^b	14.24 \pm 1.29 ^c	18.34 \pm 1.16 ^d	29.66 \pm 0.37 ^a	29.81 \pm 0.95 ^a	18.84 \pm 0.86
F+G (XIV)	2.54 \pm 0.05 ^b	10.10 \pm 0.37 ^c	22.23 \pm 1.73 ^d	28.64 \pm 0.91 ^a	31.66 \pm 1.35 ^a	19.03 \pm 0.88
F+X (III)	2.47 \pm 0.12 ^c	17.89 \pm 1.02 ^a	20.72 \pm 1.44 ^a	26.16 \pm 1.19 ^b	29.85 \pm 1.90 ^b	19.42 \pm 1.13
F+X (XII)	2.99 \pm 0.07 ^c	18.83 \pm 0.59 ^a	21.10 \pm 1.02 ^{ab}	24.07 \pm 0.83 ^b	27.51 \pm 1.61 ^d	18.90 \pm 0.82

F+X (XIV)	2.86 ± 0.34 ^a	14.08 ± 0.48 ^b	20.36 ± 0.63 ^c	27.06 ± 1.10 ^d	29.76 ± 0.74 ^e	18.82 ± 0.66
Thiol groups [$\mu\text{g -SH cm}^{-3}$]						
F (III)	2.35 ± 0.15 ^a	2.99 ± 0.15 ^{ab}	6.72 ± 0.47 ^d	4.69 ± 0.15 ^c	3.95 ± 0.53 ^{bc}	4.14 ± 0.29
F (XII)	5.28 ± 0.13 ^{ab}	7.14 ± 0.87 ^c	3.73 ± 0.40 ^a	4.37 ± 0.33 ^a	6.13 ± 0.42 ^{bc}	5.33 ± 0.43
F (XIV)	4.80 ± 0.23 ^a	5.33 ± 0.33 ^a	4.53 ± 0.87 ^a	4.69 ± 0.53 ^a	4.74 ± 0.96 ^a	4.82 ± 0.58
F+G (III)	0.43 ± 0.27 ^c	4.96 ± 1.12 ^b	8.80 ± 1.51 ^a	8.48 ± 1.26 ^{ab}	10.13 ± 0.80 ^a	6.56 ± 0.99
F+G (XII)	0.21 ± 0.08 ^b	4.58 ± 0.98 ^c	8.80 ± 1.71 ^a	8.58 ± 0.89 ^a	10.34 ± 0.98 ^a	6.50 ± 0.93
F+G (XIV)	1.44 ± 0.23 ^a	0.85 ± 0.20 ^a	5.54 ± 0.89 ^b	7.36 ± 1.45 ^b	11.78 ± 1.28 ^c	5.40 ± 0.81
F+X (III)	6.40 ± 0.91 ^c	2.67 ± 0.49 ^{ab}	3.52 ± 0.82 ^b	1.33 ± 0.27 ^a	2.13 ± 0.15 ^{ab}	3.21 ± 0.53
F+X (XII)	7.25 ± 1.32 ^b	4.74 ± 0.59 ^{ab}	3.52 ± 0.94 ^a	4.27 ± 0.72 ^{ab}	4.90 ± 0.80 ^{ab}	4.94 ± 0.87
F+X (XIV)	3.89 ± 0.64 ^a	2.67 ± 0.54 ^a	4.16 ± 0.45 ^a	4.43 ± 0.40 ^a	7.62 ± 1.57 ^b	4.55 ± 0.72
Sulfate ions [$\text{mg SO}_4^{2-} \text{ cm}^{-3}$]						
F (III)	0.32 ± 0.03 ^a	0.95 ± 0.02 ^d	1.15 ± 0.02 ^e	0.55 ± 0.03 ^b	0.66 ± 0.03 ^c	0.73 ± 0.02
F (XII)	0.59 ± 0.04 ^a	0.96 ± 0.04 ^c	0.57 ± 0.03 ^a	0.17 ± 0.01 ^b	0.53 ± 0.02 ^a	0.56 ± 0.03
F (XIV)	0.34 ± 0.03 ^a	1.00 ± 0.06 ^b	0.91 ± 0.01 ^b	0.31 ± 0.10 ^a	0.60 ± 0.02 ^c	0.63 ± 0.04
F+G (III)	0.35 ± 0.02 ^b	0.46 ± 0.02 ^c	0.98 ± 0.02 ^d	0.91 ± 0.03 ^a	0.88 ± 0.02 ^a	0.71 ± 0.02
F+G (XII)	0.34 ± 0.02 ^b	0.71 ± 0.03 ^c	0.94 ± 0.04 ^a	0.92 ± 0.04 ^a	0.87 ± 0.02 ^a	0.76 ± 0.03
F+G (XIV)	0.48 ± 0.02 ^b	0.50 ± 0.03 ^b	1.02 ± 0.06 ^a	1.03 ± 0.01 ^a	0.95 ± 0.02 ^a	0.80 ± 0.03
F+X (III)	0.22 ± 0.01 ^b	0.49 ± 0.04 ^c	0.74 ± 0.06 ^a	0.65 ± 0.03 ^a	1.02 ± 0.02 ^d	0.62 ± 0.03
F+X (XII)	0.43 ± 0.02 ^a	0.53 ± 0.01 ^a	0.81 ± 0.01 ^b	0.77 ± 0.06 ^b	1.02 ± 0.04 ^c	0.71 ± 0.03
F+X (XIV)	0.26 ± 0.02 ^b	0.42 ± 0.04 ^a	0.48 ± 0.03 ^a	0.82 ± 0.04 ^c	0.94 ± 0.03 ^d	0.58 ± 0.03
Ammonium ions [$\mu\text{g NH}_4^+ \text{ cm}^{-3}$]						
F (III)	365.53 ± 7.71 ^c	637.65 ± 9.38 ^a	620.27 ± 23.04 ^a	558.61 ± 7.19 ^b	598.95 ± 12.50 ^{ab}	556.20 ± 11.96
F (XII)	525.24 ± 7.75 ^b	687.03 ± 8.92 ^a	677.99 ± 5.42 ^a	555.37 ± 9.20 ^c	593.61 ± 10.50 ^d	607.85 ± 8.36
F (XIV)	460.33 ± 14.23 ^b	646.23 ± 2.29 ^a	668.71 ± 11.49 ^a	531.49 ± 8.98 ^c	578.08 ± 6.02 ^d	576.97 ± 8.60
F+G (III)	258.68 ± 6.55 ^b	286.49 ± 10.52 ^b	549.81 ± 3.13 ^a	562.55 ± 23.61 ^a	548.42 ± 11.70 ^a	441.19 ± 11.10
F+G (XII)	307.82 ± 27.87 ^b	403.08 ± 34.79 ^c	569.04 ± 13.06 ^a	583.18 ± 2.36 ^a	513.41 ± 22.46 ^a	475.31 ± 20.11
F+G (XIV)	308.05 ± 22.43 ^b	287.88 ± 37.37 ^b	487.69 ± 35.84 ^a	546.33 ± 36.16 ^a	569.04 ± 21.38 ^a	439.80 ± 30.64
F+X (III)	309.67 ± 19.88 ^b	499.04 ± 26.97 ^c	712.06 ± 53.76 ^a	677.52 ± 37.06 ^a	761.20 ± 24.59 ^a	591.90 ± 32.45
F+X (XII)	330.53 ± 37.86 ^d	528.94 ± 30.48 ^a	623.98 ± 27.28 ^{ab}	708.81 ± 16.43 ^{bc}	775.57 ± 45.92 ^c	593.57 ± 31.59
F+X (XIV)	303.64 ± 25.92 ^c	486.30 ± 32.72 ^b	621.89 ± 41.79 ^{ab}	689.11 ± 48.10 ^a	707.89 ± 57.38 ^a	561.77 ± 41.18

Explanations: Letters a, b, and c denote means forming homogenous groups, which were determined by one-way ANOVA and HSD-Tukey post-hoc test. If the means are marked with the same letter (e.g. a), they do not differ significantly (at $\alpha = 0.05$). If the means are given different letters (e.g.: a and b, they differ significantly from each other (at $\alpha = 0.05$).

Table S2. Dynamics of changes in enzymatic activity and the secretion of organic and mineral products of chicken feathers keratinolysis by *Trichophyton ajelloi* strains at various concentrations (1.0, 1.5 and 2.0%) of feather waste.

Days	7	14	21	28	35	Mean
Protease [$\mu\text{g tyrosine cm}^{-3}$]						
1.0% (III)	48.15 \pm 3.90 ^a	58.87 \pm 3.26 ^b	40.24 \pm 0.55 ^a	59.02 \pm 3.99 ^b	70.56 \pm 1.27 ^c	55.37 \pm 2.59
1.0% (XII)	44.82 \pm 1.09 ^{ac}	47.56 \pm 2.08 ^a	37.57 \pm 1.64 ^b	40.01 \pm 1.27 ^{bc}	49.41 \pm 2.16 ^a	43.88 \pm 1.65
1.0% (XIV)	49.04 \pm 2.54 ^c	38.09 \pm 3.02 ^{ab}	32.84 \pm 0.79 ^a	33.14 \pm 3.26 ^a	42.16 \pm 1.57 ^{bc}	39.05 \pm 2.24
1.5% (III)	25.15 \pm 3.02 ^b	39.87 \pm 4.01 ^a	39.94 \pm 4.26 ^a	34.54 \pm 2.21 ^{ab}	37.43 \pm 2.60 ^a	35.38 \pm 3.22
1.5% (XII)	40.38 \pm 2.38 ^{ab}	51.70 \pm 4.08 ^b	46.38 \pm 2.98 ^{ab}	38.17 \pm 5.16 ^a	37.20 \pm 1.48 ^a	42.77 \pm 3.22
1.5% (XIV)	36.17 \pm 1.96 ^a	50.89 \pm 9.60 ^a	60.06 \pm 17.68 ^a	66.35 \pm 9.67 ^a	71.30 \pm 9.81 ^a	56.95 \pm 9.74
2.0% (III)	36.76 \pm 1.09 ^b	62.50 \pm 1.37 ^a	64.72 \pm 3.68 ^a	56.66 \pm 0.52 ^a	57.54 \pm 5.49 ^a	55.64 \pm 2.43
2.0% (XII)	33.28 \pm 2.44 ^b	58.65 \pm 9.01 ^a	57.47 \pm 3.57 ^a	51.11 \pm 3.17 ^{ab}	56.29 \pm 7.08 ^a	51.36 \pm 5.05
2.0% (XIV)	58.73 \pm 5.39 ^a	64.42 \pm 11.43 ^a	65.83 \pm 6.55 ^a	73.30 \pm 16.44 ^a	63.98 \pm 11.28 ^a	65.25 \pm 10.22
Keratinase [KU cm^{-3}]						
1.0% (III)	54.77 \pm 1.68 ^b	79.57 \pm 1.75 ^a	81.03 \pm 1.54 ^a	80.73 \pm 2.78 ^a	93.70 \pm 1.69 ^c	77.96 \pm 1.89
1.0% (XII)	40.23 \pm 2.05 ^a	38.53 \pm 1.55 ^a	48.40 \pm 2.27 ^b	44.30 \pm 2.60 ^{ab}	56.97 \pm 1.62 ^c	45.69 \pm 2.02
1.0% (XIV)	39.67 \pm 2.48 ^a	42.87 \pm 1.02 ^{ab}	49.13 \pm 2.52 ^{bc}	50.27 \pm 1.62 ^c	56.80 \pm 1.39 ^d	47.75 \pm 1.81
1.5% (III)	21.13 \pm 2.50 ^b	35.73 \pm 5.26 ^{ab}	42.67 \pm 7.02 ^a	48.27 \pm 5.77 ^a	73.87 \pm 5.17 ^c	44.33 \pm 5.14
1.5% (XII)	34.03 \pm 3.98 ^b	46.70 \pm 2.98 ^{ab}	55.63 \pm 9.16 ^a	58.37 \pm 3.92 ^a	87.43 \pm 3.14 ^c	56.43 \pm 4.64
1.5% (XIV)	35.27 \pm 0.97 ^a	39.40 \pm 1.21 ^a	55.37 \pm 3.23 ^b	66.60 \pm 2.42 ^b	80.33 \pm 6.60 ^c	55.39 \pm 2.89
2.0% (III)	34.97 \pm 2.05 ^b	60.73 \pm 5.74 ^a	63.30 \pm 2.55 ^a	85.47 \pm 2.68 ^c	111.37 \pm 3.66 ^d	71.17 \pm 3.34
2.0% (XII)	31.73 \pm 1.27 ^b	60.00 \pm 3.32 ^a	54.40 \pm 4.62 ^a	84.07 \pm 3.49 ^c	116.20 \pm 4.47 ^d	69.28 \pm 3.43
2.0% (XIV)	44.10 \pm 3.43 ^b	69.50 \pm 5.13 ^a	79.67 \pm 2.86 ^a	107.10 \pm 2.05 ^c	127.30 \pm 8.15 ^d	85.53 \pm 4.33
Disulfide reductase [U cm^{-3}]						
1.0% (III)	0.010 \pm 0.001 ^a	0.013 \pm 0.005 ^a	0.013 \pm 0.005 ^a	0.019 \pm 0.008 ^{ab}	0.032 \pm 0.005 ^b	0.017 \pm 0.004
1.0% (XII)	0.194 \pm 0.008 ^{ab}	0.188 \pm 0.012 ^a	0.223 \pm 0.008 ^{bc}	0.207 \pm 0.012 ^{ab}	0.256 \pm 0.012 ^c	0.214 \pm 0.010
1.0% (XIV)	0.013 \pm 0.005 ^a	0.036 \pm 0.009 ^b	0.019 \pm 0.008 ^{ab}	0.026 \pm 0.005 ^{ab}	0.084 \pm 0.005 ^c	0.036 \pm 0.006
1.5% (III)	0.013 \pm 0.005 ^a	0.019 \pm 0.001 ^a	0.026 \pm 0.009 ^a	0.023 \pm 0.005 ^a	0.029 \pm 0.008 ^a	0.022 \pm 0.005
1.5% (XII)	0.074 \pm 0.005 ^b	0.065 \pm 0.005 ^b	0.036 \pm 0.005 ^a	0.026 \pm 0.009 ^a	0.029 \pm 0.001 ^a	0.046 \pm 0.005
1.5% (XIV)	0.104 \pm 0.012 ^b	0.039 \pm 0.008 ^a	0.133 \pm 0.009 ^c	0.049 \pm 0.008 ^a	0.055 \pm 0.005 ^a	0.076 \pm 0.008
2.0% (III)	0.023 \pm 0.005 ^{bc}	0.013 \pm 0.005 ^b	0.039 \pm 0.008 ^{ac}	0.042 \pm 0.005 ^a	0.052 \pm 0.005 ^a	0.034 \pm 0.005
2.0% (XII)	0.032 \pm 0.005 ^{bc}	0.019 \pm 0.008 ^b	0.065 \pm 0.005 ^a	0.065 \pm 0.009 ^a	0.055 \pm 0.009 ^{ac}	0.047 \pm 0.007
2.0% (XIV)	0.061 \pm 0.005 ^a	0.016 \pm 0.005 ^b	0.107 \pm 0.008 ^c	0.058 \pm 0.008 ^a	0.061 \pm 0.005 ^a	0.061 \pm 0.006
Proteins and peptides [$\mu\text{g of proteins cm}^{-3}$]						
1.0% (III)	297.42 \pm 5.44 ^b	473.18 \pm 7.52 ^a	473.37 \pm 6.33 ^a	509.37 \pm 7.35 ^c	545.95 \pm 19.68 ^d	459.86 \pm 9.26
1.0% (XII)	341.12 \pm 20.62 ^b	421.78 \pm 14.01 ^a	387.32 \pm 9.27 ^{ab}	394.06 \pm 14.68 ^a	430.25 \pm 15.16 ^a	394.91 \pm 14.75
1.0% (XIV)	308.40 \pm 7.41 ^d	394.06 \pm 1.91 ^{bc}	365.19 \pm 2.37 ^a	378.85 \pm 6.48 ^{ab}	413.12 \pm 10.90 ^c	371.92 \pm 5.81
1.5% (III)	292.03 \pm 24.33 ^c	457.40 \pm 26.14 ^a	472.03 \pm 17.48 ^a	539.02 \pm 12.87 ^b	573.67 \pm 11.52 ^b	466.83 \pm 18.47
1.5% (XII)	350.55 \pm 5.44 ^a	470.10 \pm 1.25 ^b	539.79 \pm 1.66 ^c	605.82 \pm 4.79 ^d	663.57 \pm 18.93 ^c	525.97 \pm 6.41
1.5% (XIV)	399.45 \pm 44.04 ^a	504.56 \pm 46.01 ^a	613.13 \pm 20.28 ^c	719.78 \pm 17.11 ^b	783.12 \pm 21.75 ^b	604.01 \pm 29.84
2.0% (III)	431.79 \pm 12.84 ^d	602.35 \pm 3.56 ^a	687.63 \pm 31.93 ^{ab}	791.01 \pm 48.45 ^{bc}	902.47 \pm 53.69 ^c	683.05 \pm 30.09
2.0% (XII)	378.47 \pm 21.26 ^b	585.41 \pm 35.92 ^c	673.77 \pm 22.88 ^d	773.30 \pm 1.70 ^a	836.44 \pm 26.70 ^a	649.48 \pm 21.69
2.0% (XIV)	469.91 \pm 20.01 ^b	686.29 \pm 34.06 ^c	773.49 \pm 31.41 ^d	853.38 \pm 2.88 ^a	921.72 \pm 9.29 ^a	740.96 \pm 19.53
Amino groups [$\mu\text{g N-NH}_2 \text{ cm}^{-3}$]						
1.0% (III)	5.78 \pm 0.43 ^a	10.62 \pm 0.23 ^b	10.34 \pm 0.30 ^b	6.16 \pm 0.33 ^a	6.61 \pm 0.19 ^a	7.90 \pm 0.30
1.0% (XII)	7.02 \pm 0.16 ^b	10.89 \pm 0.15 ^c	11.98 \pm 0.31 ^a	12.57 \pm 0.34 ^a	14.46 \pm 0.33 ^d	11.38 \pm 0.26
1.0% (XIV)	5.37 \pm 0.31 ^b	8.32 \pm 0.24 ^a	9.15 \pm 0.28 ^a	7.32 \pm 0.17 ^c	8.42 \pm 0.32 ^a	7.72 \pm 0.26
1.5% (III)	3.80 \pm 0.16 ^b	13.79 \pm 0.72 ^c	31.97 \pm 1.02 ^a	32.41 \pm 1.83 ^a	33.71 \pm 1.86 ^a	23.14 \pm 1.12
1.5% (XII)	2.76 \pm 0.18 ^b	9.03 \pm 0.39 ^c	24.48 \pm 0.52 ^a	25.29 \pm 1.50 ^a	25.96 \pm 0.75 ^a	17.50 \pm 0.67
1.5% (XIV)	2.80 \pm 0.12 ^b	8.80 \pm 0.89 ^c	25.17 \pm 0.47 ^a	26.66 \pm 0.92 ^a	27.56 \pm 1.45 ^a	18.20 \pm 0.77
2.0% (III)	2.48 \pm 0.10 ^b	12.00 \pm 0.57 ^c	31.17 \pm 2.14 ^a	27.07 \pm 1.73 ^a	27.84 \pm 1.14 ^a	20.11 \pm 1.14
2.0% (XII)	3.60 \pm 0.15 ^b	8.74 \pm 0.96 ^c	35.18 \pm 0.82 ^d	21.55 \pm 1.09 ^a	22.58 \pm 1.71 ^a	18.33 \pm 0.95
2.0% (XIV)	2.93 \pm 0.11 ^b	9.44 \pm 0.28 ^c	29.33 \pm 0.03 ^d	25.94 \pm 0.95 ^a	27.06 \pm 0.89 ^a	18.94 \pm 0.45

Thiol groups [$\mu\text{g -SH cm}^{-3}$]						
1.0% (III)	2.35 ± 0.15^a	2.99 ± 0.15^{ab}	6.72 ± 0.47^d	4.69 ± 0.15^c	3.95 ± 0.53^{bc}	4.14 ± 0.29
1.0% (XII)	5.28 ± 0.13^{ab}	7.14 ± 0.87^c	3.73 ± 0.40^a	4.37 ± 0.33^a	6.13 ± 0.42^{bc}	5.33 ± 0.43
1.0% (XIV)	4.80 ± 0.23^a	5.33 ± 0.33^a	4.53 ± 0.87^a	4.69 ± 0.53^a	4.74 ± 0.96^a	4.82 ± 0.58
1.5% (III)	2.24 ± 0.35^{ab}	3.47 ± 0.46^b	2.67 ± 0.33^{ab}	1.71 ± 0.27^a	7.09 ± 0.79^c	3.43 ± 0.44
1.5% (XII)	6.18 ± 0.42^c	3.52 ± 0.47^b	9.49 ± 0.49^d	0.69 ± 0.20^a	19.51 ± 1.45^e	7.88 ± 0.61
1.5% (XIV)	8.48 ± 0.86^a	5.22 ± 0.49^a	8.69 ± 1.63^a	5.33 ± 0.33^a	23.99 ± 2.26^b	10.34 ± 1.11
2.0% (III)	7.84 ± 0.13^a	8.26 ± 1.11^{ab}	11.04 ± 0.79^b	9.92 ± 0.60^{ab}	38.33 ± 1.44^c	15.08 ± 0.81
2.0% (XII)	6.02 ± 0.80^a	9.44 ± 1.25^a	14.82 ± 2.12^b	22.44 ± 1.17^c	34.76 ± 2.08^d	17.50 ± 1.48
2.0% (XIV)	11.04 ± 1.77^a	9.49 ± 1.49^a	34.17 ± 0.72^c	9.97 ± 0.42^a	25.96 ± 2.17^b	18.13 ± 1.31
Sulfate ions [$\text{mg SO}_4^{2-} \text{ cm}^{-3}$]						
1.0% (III)	0.32 ± 0.03^a	0.95 ± 0.02^d	1.15 ± 0.02^e	0.55 ± 0.03^b	0.66 ± 0.03^c	0.73 ± 0.02
1.0% (XII)	0.59 ± 0.04^a	0.96 ± 0.04^c	0.57 ± 0.03^a	0.17 ± 0.01^b	0.53 ± 0.02^a	0.56 ± 0.03
1.0% (XIV)	0.34 ± 0.03^a	1.00 ± 0.06^b	0.91 ± 0.01^b	0.31 ± 0.10^a	0.60 ± 0.02^c	0.63 ± 0.04
1.5% (III)	0.94 ± 0.04^b	0.71 ± 0.03^a	1.18 ± 0.02^c	0.74 ± 0.03^a	0.93 ± 0.03^b	0.90 ± 0.03
1.5% (XII)	0.86 ± 0.03^a	0.72 ± 0.03^c	1.31 ± 0.03^d	0.90 ± 0.03^{ab}	1.02 ± 0.06^b	0.96 ± 0.04
1.5% (XIV)	0.77 ± 0.01^a	0.51 ± 0.02^b	1.03 ± 0.03^c	0.71 ± 0.04^a	0.76 ± 0.04^a	0.76 ± 0.03
2.0% (III)	1.10 ± 0.03^a	1.06 ± 0.17^a	1.75 ± 0.08^b	1.12 ± 0.05^a	1.27 ± 0.02^a	1.26 ± 0.07
2.0% (XII)	1.07 ± 0.02^a	1.15 ± 0.03^{ab}	1.94 ± 0.04^c	1.10 ± 0.03^a	1.26 ± 0.04^b	1.30 ± 0.03
2.0% (XIV)	0.95 ± 0.03^a	0.78 ± 0.02^b	1.57 ± 0.03^d	0.98 ± 0.04^a	1.12 ± 0.04^c	1.08 ± 0.03
Ammonium ions [$\mu\text{g NH}_4^+ \text{ cm}^{-3}$]						
1.0% (III)	365.53 ± 7.71^c	637.65 ± 9.38^a	620.27 ± 23.04^a	558.61 ± 7.19^b	598.95 ± 12.50^{ab}	556.20 ± 11.96
1.0% (XII)	525.24 ± 7.75^b	687.03 ± 8.92^a	677.99 ± 5.42^a	555.37 ± 9.20^c	593.61 ± 10.50^d	607.85 ± 8.36
1.0% (XIV)	460.33 ± 14.23^b	646.23 ± 2.29^a	668.71 ± 11.49^a	531.49 ± 8.98^c	578.08 ± 6.02^d	576.97 ± 8.60
1.5% (III)	381.53 ± 15.34^c	732.92 ± 28.62^b	738.95 ± 29.06^b	535.90 ± 3.47^a	568.58 ± 32.35^a	591.57 ± 21.77
1.5% (XII)	434.37 ± 57.12^a	501.59 ± 13.84^a	562.09 ± 22.43^a	874.31 ± 45.89^b	531.49 ± 47.75^a	580.77 ± 37.40
1.5% (XIV)	306.19 ± 23.28^c	429.51 ± 33.58^a	528.02 ± 20.32^b	539.38 ± 6.12^b	442.95 ± 25.09^a	449.21 ± 21.68
2.0% (III)	457.79 ± 29.37^b	638.35 ± 46.84^a	721.79 ± 65.36^a	621.20 ± 49.91^a	622.82 ± 44.88^a	612.39 ± 47.27
2.0% (XII)	290.66 ± 36.08^c	735.01 ± 69.05^{ab}	813.35 ± 23.34^b	679.84 ± 16.47^a	643.22 ± 6.32^a	632.42 ± 30.25
2.0% (XIV)	186.36 ± 19.90^c	583.65 ± 29.06^{ab}	669.18 ± 18.15^b	595.70 ± 42.34^{ab}	530.10 ± 69.55^a	513.00 ± 35.80

Explanations: as in Table S1.

Table S3. Dynamics of changes in enzymatic activity and the secretion of organic and mineral products of chicken feathers keratinolysis by *Trichophyton ajelloi* strains at different initial pH (4.5, 6.5, 8.5) of the culture medium.

Days	7	14	21	28	35	Mean
Protease [$\mu\text{g tyrosine cm}^{-3}$]						
4.5 (III)	48.15 \pm 3.90 ^a	58.87 \pm 3.26 ^b	40.24 \pm 0.55 ^a	59.02 \pm 3.99 ^b	70.56 \pm 1.27 ^c	55.37 \pm 2.59
4.5 (XII)	44.82 \pm 1.09 ^{ac}	47.56 \pm 2.08 ^a	37.57 \pm 1.64 ^b	40.01 \pm 1.27 ^{bc}	49.41 \pm 2.16 ^a	43.88 \pm 1.65
4.5 (XIV)	49.04 \pm 2.54 ^c	38.09 \pm 3.02 ^{ab}	32.84 \pm 0.79 ^a	33.14 \pm 3.26 ^a	42.16 \pm 1.57 ^{bc}	39.05 \pm 2.24
6.5 (III)	95.34 \pm 5.96 ^b	55.18 \pm 7.28 ^a	39.27 \pm 3.72 ^a	37.06 \pm 5.97 ^a	43.64 \pm 6.28 ^a	54.10 \pm 5.84
6.5 (XII)	48.59 \pm 5.33 ^a	37.43 \pm 7.00 ^a	34.10 \pm 9.48 ^a	42.31 \pm 9.31 ^a	43.12 \pm 8.59 ^a	41.11 \pm 7.94
6.5 (XIV)	24.33 \pm 2.77 ^{ab}	21.30 \pm 2.27 ^{ab}	19.16 \pm 1.05 ^a	23.30 \pm 1.31 ^{ab}	26.40 \pm 1.84 ^b	22.90 \pm 1.85
8.5 (III)	51.70 \pm 9.83 ^a	58.87 \pm 9.80 ^a	34.61 \pm 6.73 ^a	35.95 \pm 4.87 ^a	40.38 \pm 3.46 ^a	44.30 \pm 6.94
8.5 (XII)	26.40 \pm 2.74 ^a	29.29 \pm 3.92 ^a	30.32 \pm 5.00 ^a	34.10 \pm 1.11 ^a	36.02 \pm 3.12 ^a	31.23 \pm 3.18
8.5 (XIV)	18.49 \pm 3.72 ^a	18.05 \pm 2.61 ^a	23.96 \pm 4.26 ^a	27.00 \pm 2.28 ^a	25.59 \pm 3.40 ^a	22.62 \pm 3.26
Keratinase [KU cm⁻³]						
4.5 (III)	54.77 \pm 1.68 ^b	79.57 \pm 1.75 ^a	81.03 \pm 1.54 ^a	80.73 \pm 2.78 ^a	93.70 \pm 1.69 ^c	77.96 \pm 1.89
4.5 (XII)	40.23 \pm 2.05 ^a	38.53 \pm 1.55 ^a	48.40 \pm 2.27 ^b	44.30 \pm 2.60 ^{ab}	56.97 \pm 1.62 ^c	45.69 \pm 2.02
4.5 (XIV)	39.67 \pm 2.48 ^a	42.87 \pm 1.02 ^{ab}	49.13 \pm 2.52 ^{bc}	50.27 \pm 1.62 ^c	56.80 \pm 1.39 ^d	47.75 \pm 1.81
6.5 (III)	21.87 \pm 3.97 ^a	29.40 \pm 6.13 ^{ab}	44.93 \pm 6.84 ^{bc}	106.70 \pm 4.32 ^d	60.77 \pm 4.15 ^c	52.73 \pm 5.08
6.5 (XII)	16.97 \pm 0.87 ^b	33.23 \pm 1.32 ^a	43.13 \pm 3.01 ^a	97.83 \pm 5.27 ^d	60.40 \pm 3.66 ^c	50.31 \pm 2.83
6.5 (XIV)	15.80 \pm 3.64 ^a	14.33 \pm 2.39 ^a	34.20 \pm 0.80 ^b	90.00 \pm 3.63 ^d	49.10 \pm 2.05 ^c	40.69 \pm 2.50
8.5 (III)	18.17 \pm 1.20 ^a	18.80 \pm 6.61 ^a	39.13 \pm 5.61 ^b	98.03 \pm 2.99 ^d	62.38 \pm 3.33 ^c	47.30 \pm 3.95
8.5 (XII)	18.97 \pm 1.81 ^a	16.70 \pm 2.33 ^a	42.27 \pm 5.38 ^b	115.33 \pm 2.49 ^d	64.07 \pm 3.07 ^c	51.47 \pm 3.01
8.5 (XIV)	19.70 \pm 7.02 ^a	16.47 \pm 4.25 ^a	36.93 \pm 4.69 ^b	110.23 \pm 4.66 ^d	63.27 \pm 2.67 ^c	49.32 \pm 4.66
Disulfide reductase [U cm⁻³]						
4.5 (III)	0.010 \pm 0.001 ^a	0.013 \pm 0.005 ^a	0.013 \pm 0.005 ^a	0.019 \pm 0.008 ^{ab}	0.032 \pm 0.005 ^b	0.017 \pm 0.004
4.5 (XII)	0.194 \pm 0.008 ^{ab}	0.188 \pm 0.012 ^a	0.223 \pm 0.008 ^{bc}	0.207 \pm 0.012 ^{ab}	0.256 \pm 0.012 ^c	0.214 \pm 0.010
4.5 (XIV)	0.013 \pm 0.005 ^a	0.036 \pm 0.009 ^b	0.019 \pm 0.008 ^{ab}	0.026 \pm 0.005 ^{ab}	0.084 \pm 0.005 ^c	0.036 \pm 0.006
6.5 (III)	0.019 \pm 0.008 ^a	0.036 \pm 0.009 ^{ab}	0.029 \pm 0.008 ^{ab}	0.049 \pm 0.008 ^b	0.084 \pm 0.009 ^c	0.043 \pm 0.008
6.5 (XII)	0.039 \pm 0.008 ^a	0.045 \pm 0.005 ^a	0.026 \pm 0.005 ^a	0.078 \pm 0.008 ^b	0.094 \pm 0.012 ^b	0.056 \pm 0.007
6.5 (XIV)	0.029 \pm 0.008 ^{ab}	0.042 \pm 0.012 ^{ab}	0.036 \pm 0.009 ^{ab}	0.023 \pm 0.005 ^a	0.055 \pm 0.012 ^b	0.037 \pm 0.009
8.5 (III)	0.016 \pm 0.005 ^b	0.055 \pm 0.009 ^a	0.045 \pm 0.005 ^a	0.058 \pm 0.008 ^a	0.149 \pm 0.012 ^c	0.065 \pm 0.008
8.5 (XII)	0.013 \pm 0.005 ^a	0.029 \pm 0.008 ^{ab}	0.042 \pm 0.005 ^b	0.016 \pm 0.005 ^a	0.117 \pm 0.008 ^c	0.043 \pm 0.006
8.5 (XIV)	0.026 \pm 0.017 ^a	0.029 \pm 0.008 ^a	0.039 \pm 0.014 ^a	0.039 \pm 0.008 ^a	0.091 \pm 0.012 ^b	0.045 \pm 0.012
Proteins and peptides [$\mu\text{g of proteins cm}^{-3}$]						
4.5 (III)	297.42 \pm 5.44 ^b	473.18 \pm 7.52 ^a	473.37 \pm 6.33 ^a	509.37 \pm 7.35 ^c	545.95 \pm 19.68 ^d	459.86 \pm 9.26
4.5 (XII)	341.12 \pm 20.62 ^b	421.78 \pm 14.01 ^a	387.32 \pm 9.27 ^{ab}	394.06 \pm 14.68 ^a	430.25 \pm 15.16 ^a	394.91 \pm 14.75
4.5 (XIV)	308.40 \pm 7.41 ^d	394.06 \pm 1.91 ^{bc}	365.19 \pm 2.37 ^a	378.85 \pm 6.48 ^{ab}	413.12 \pm 10.90 ^c	371.92 \pm 5.81
6.5 (III)	253.15 \pm 14.66 ^c	331.88 \pm 15.36 ^a	372.89 \pm 9.63 ^a	457.78 \pm 26.16 ^b	499.55 \pm 13.07 ^b	383.05 \pm 15.78
6.5 (XII)	222.54 \pm 31.28 ^a	319.95 \pm 16.78 ^{ab}	385.40 \pm 24.89 ^{bc}	478.38 \pm 25.49 ^{cd}	500.90 \pm 48.65 ^d	381.43 \pm 29.42
6.5 (XIV)	176.72 \pm 15.18 ^a	258.34 \pm 16.51 ^b	313.98 \pm 12.95 ^c	401.38 \pm 10.99 ^d	445.85 \pm 9.68 ^e	319.25 \pm 13.06
8.5 (III)	182.69 \pm 24.00 ^c	275.67 \pm 23.98 ^a	332.65 \pm 11.62 ^{ab}	385.21 \pm 21.24 ^b	465.10 \pm 1.96 ^d	328.26 \pm 16.56
8.5 (XII)	192.12 \pm 26.88 ^c	316.48 \pm 6.95 ^a	354.02 \pm 13.88 ^a	436.80 \pm 26.07 ^b	490.31 \pm 16.40 ^b	357.95 \pm 18.04
8.5 (XIV)	166.90 \pm 28.06 ^a	262.19 \pm 14.73 ^{ab}	317.64 \pm 42.48 ^{bc}	401.95 \pm 41.16 ^{cd}	454.51 \pm 45.75 ^d	320.64 \pm 34.44
Amino groups [$\mu\text{g N-NH}_2 \text{ cm}^{-3}$]						
4.5 (III)	5.78 \pm 0.43 ^a	10.62 \pm 0.23 ^b	10.34 \pm 0.30 ^b	6.16 \pm 0.33 ^a	6.61 \pm 0.19 ^a	7.90 \pm 0.30
4.5 (XII)	7.02 \pm 0.16 ^b	10.89 \pm 0.15 ^c	11.98 \pm 0.31 ^a	12.57 \pm 0.34 ^a	14.46 \pm 0.33 ^d	11.38 \pm 0.26
4.5 (XIV)	5.37 \pm 0.31 ^b	8.32 \pm 0.24 ^a	9.15 \pm 0.28 ^a	7.32 \pm 0.17 ^c	8.42 \pm 0.32 ^a	7.72 \pm 0.26
6.5 (III)	24.07 \pm 0.68 ^a	32.62 \pm 1.06 ^b	50.03 \pm 0.70 ^d	36.84 \pm 1.80 ^c	23.61 \pm 0.39 ^a	33.43 \pm 0.92
6.5 (XII)	19.88 \pm 0.47 ^b	30.68 \pm 1.07 ^c	58.49 \pm 0.83 ^d	26.27 \pm 0.33 ^a	25.52 \pm 1.00 ^a	32.17 \pm 0.74
6.5 (XIV)	20.66 \pm 0.14 ^a	30.69 \pm 1.10 ^b	55.85 \pm 1.54 ^c	27.76 \pm 1.00 ^b	22.50 \pm 0.49 ^a	31.49 \pm 0.85
8.5 (III)	16.18 \pm 0.71 ^a	25.00 \pm 0.24 ^b	45.72 \pm 2.00 ^c	19.25 \pm 1.25 ^a	16.60 \pm 1.07 ^a	24.55 \pm 1.06
8.5 (XII)	15.87 \pm 0.90 ^a	25.27 \pm 0.92 ^b	44.97 \pm 1.36 ^c	26.01 \pm 0.98 ^b	17.77 \pm 0.96 ^a	25.98 \pm 1.03
8.5 (XIV)	18.61 \pm 0.43 ^a	23.49 \pm 0.28 ^b	36.28 \pm 0.59 ^d	28.56 \pm 0.71 ^c	19.34 \pm 0.44 ^a	25.26 \pm 0.49

Thiol groups [$\mu\text{g -SH cm}^{-3}$]						
4.5 (III)	2.35 ± 0.15^a	2.99 ± 0.15^{ab}	6.72 ± 0.47^d	4.69 ± 0.15^c	3.95 ± 0.53^{bc}	4.14 ± 0.29
4.5 (XII)	5.28 ± 0.13^{ab}	7.14 ± 0.87^c	3.73 ± 0.40^a	4.37 ± 0.33^a	6.13 ± 0.42^{bc}	5.33 ± 0.43
4.5 (XIV)	4.80 ± 0.23^a	5.33 ± 0.33^a	4.53 ± 0.87^a	4.69 ± 0.53^a	4.74 ± 0.96^a	4.82 ± 0.58
6.5 (III)	3.84 ± 0.26^a	0.85 ± 0.20^b	0.80 ± 0.13^b	4.69 ± 1.06^a	4.90 ± 1.29^a	3.02 ± 0.59
6.5 (XII)	1.97 ± 0.38^a	1.92 ± 0.35^a	3.04 ± 0.23^a	2.51 ± 0.40^a	6.77 ± 0.98^b	3.24 ± 0.47
6.5 (XIV)	0.75 ± 0.20^a	1.71 ± 0.53^a	3.89 ± 0.59^b	1.49 ± 0.42^a	2.24 ± 0.47^a	2.02 ± 0.44
8.5 (III)	2.72 ± 0.78^a	0.91 ± 0.20^a	0.69 ± 0.20^a	2.77 ± 0.53^a	5.81 ± 1.18^b	2.58 ± 0.58
8.5 (XII)	2.61 ± 0.85^a	1.33 ± 0.40^a	1.23 ± 0.33^a	1.71 ± 0.49^a	4.80 ± 0.35^b	2.34 ± 0.48
8.5 (XIV)	1.55 ± 0.33^a	0.80 ± 0.13^{ab}	1.65 ± 0.08^a	0.27 ± 0.15^b	5.22 ± 0.59^c	1.90 ± 0.25
Sulfate ions [$\text{mg SO}_4^{2-} \text{ cm}^{-3}$]						
4.5 (III)	0.32 ± 0.03^a	0.95 ± 0.02^d	1.15 ± 0.02^e	0.55 ± 0.03^b	0.66 ± 0.03^c	0.73 ± 0.02
4.5 (XII)	0.59 ± 0.04^a	0.96 ± 0.04^c	0.57 ± 0.03^a	0.17 ± 0.01^b	0.53 ± 0.02^a	0.56 ± 0.03
4.5 (XIV)	0.34 ± 0.03^a	1.00 ± 0.06^b	0.91 ± 0.01^b	0.31 ± 0.10^a	0.60 ± 0.02^c	0.63 ± 0.04
6.5 (III)	0.61 ± 0.03^b	0.95 ± 0.02^a	0.61 ± 0.03^b	0.88 ± 0.04^a	0.95 ± 0.03^a	0.80 ± 0.03
6.5 (XII)	0.65 ± 0.03^a	1.08 ± 0.03^c	0.67 ± 0.03^a	0.90 ± 0.06^b	0.97 ± 0.03^{bc}	0.85 ± 0.04
6.5 (XIV)	0.65 ± 0.03^a	1.00 ± 0.04^b	0.58 ± 0.03^a	0.67 ± 0.02^a	1.02 ± 0.04^b	0.78 ± 0.03
8.5 (III)	0.67 ± 0.02^a	0.98 ± 0.02^b	0.55 ± 0.04^c	0.73 ± 0.04^a	0.92 ± 0.03^b	0.77 ± 0.03
8.5 (XII)	0.67 ± 0.02^a	0.92 ± 0.04^b	0.54 ± 0.03^c	0.73 ± 0.02^a	0.88 ± 0.04^b	0.75 ± 0.03
8.5 (XIV)	0.73 ± 0.01^{ab}	0.82 ± 0.02^a	0.67 ± 0.04^b	0.80 ± 0.03^a	0.94 ± 0.04^c	0.79 ± 0.03
Ammonium ions [$\mu\text{g NH}_4^+ \text{ cm}^{-3}$]						
4.5 (III)	365.53 ± 7.71^c	637.65 ± 9.38^a	620.27 ± 23.04^a	558.61 ± 7.19^b	598.95 ± 12.50^{ab}	556.20 ± 11.96
4.5 (XII)	525.24 ± 7.75^b	687.03 ± 8.92^a	677.99 ± 5.42^a	555.37 ± 9.20^c	593.61 ± 10.50^d	607.85 ± 8.36
4.5 (XIV)	460.33 ± 14.23^b	646.23 ± 2.29^a	668.71 ± 11.49^a	531.49 ± 8.98^c	578.08 ± 6.02^d	576.97 ± 8.60
6.5 (III)	459.41 ± 27.58^a	587.36 ± 40.84^c	544.24 ± 16.69^{bc}	482.59 ± 9.85^{ab}	431.82 ± 16.78^a	501.08 ± 22.35
6.5 (XII)	474.01 ± 13.16^{ab}	574.61 ± 41.73^c	528.71 ± 6.25^{bc}	474.01 ± 16.55^{ab}	441.56 ± 15.56^a	498.58 ± 18.65
6.5 (XIV)	445.27 ± 12.51^a	565.80 ± 19.51^c	524.31 ± 28.23^{bc}	464.97 ± 19.48^{ab}	414.90 ± 9.02^a	483.05 ± 17.75
8.5 (III)	327.06 ± 39.48^a	491.86 ± 16.06^c	437.85 ± 19.87^{bc}	364.61 ± 13.63^{ab}	295.07 ± 17.05^a	383.29 ± 21.22
8.5 (XII)	363.45 ± 41.48^a	493.25 ± 11.97^b	439.94 ± 21.05^b	348.84 ± 10.00^a	296.92 ± 10.79^a	388.48 ± 19.06
8.5 (XIV)	338.41 ± 28.50^a	475.17 ± 8.80^b	427.88 ± 16.55^b	349.77 ± 11.40^a	294.61 ± 15.67^a	377.17 ± 16.18

Explanations: as in Table S1.

Table S4. Dynamics of changes in enzymatic activity and the secretion of organic and mineral products of chicken feathers keratinolysis of by *Trichophyton ajelloi* strains fungi in various culture temperature variants (20, 28 and 37°C).

Days	7	14	21	28	35	Mean
Protease [$\mu\text{g tyrosine cm}^{-3}$]						
20°C (III)	61.69 \pm 12.15 ^d	246.82 \pm 8.67 ^c	226.48 \pm 6.42 ^a	188.46 \pm 22.34 ^{ab}	173.00 \pm 12.58 ^a	179.29 \pm 12.43
20°C (XII)	51.18 \pm 8.25 ^c	240.90 \pm 5.80 ^b	211.24 \pm 3.54 ^b	163.31 \pm 18.21 ^a	134.76 \pm 15.21 ^a	160.28 \pm 10.20
20°C (XIV)	168.93 \pm 0.75 ^a	221.30 \pm 4.86 ^b	204.36 \pm 9.91 ^b	159.76 \pm 5.99 ^a	136.17 \pm 8.70 ^c	178.10 \pm 6.04
28°C (III)	48.15 \pm 3.90 ^a	58.87 \pm 3.26 ^b	40.24 \pm 0.55 ^a	59.02 \pm 3.99 ^b	70.56 \pm 1.27 ^c	55.37 \pm 2.59
28°C (XII)	44.82 \pm 1.09 ^{ac}	47.56 \pm 2.08 ^a	37.57 \pm 1.64 ^b	40.01 \pm 1.27 ^{bc}	49.41 \pm 2.16 ^a	43.88 \pm 1.65
28°C (XIV)	49.04 \pm 2.54 ^c	38.09 \pm 3.02 ^{ab}	32.84 \pm 0.79 ^a	33.14 \pm 3.26 ^a	42.16 \pm 1.57 ^{bc}	39.05 \pm 2.24
37°C (III)	24.11 \pm 0.42 ^a	26.63 \pm 2.06 ^{ab}	35.72 \pm 2.37 ^b	27.88 \pm 4.45 ^{ab}	31.06 \pm 3.36 ^{ab}	29.08 \pm 2.53
37°C (XII)	22.63 \pm 1.89 ^a	27.07 \pm 1.89 ^a	41.05 \pm 7.62 ^b	30.77 \pm 2.91 ^{ab}	33.51 \pm 3.03 ^{ab}	31.01 \pm 3.47
37°C (XIV)	14.27 \pm 0.89 ^a	22.41 \pm 2.57 ^{ab}	25.07 \pm 3.64 ^{ab}	23.45 \pm 7.01 ^{ab}	27.07 \pm 2.04 ^b	22.46 \pm 3.23
Keratinase [KU cm⁻³]						
20°C (III)	24.47 \pm 4.58 ^b	37.00 \pm 4.93 ^{ab}	40.20 \pm 3.69 ^a	50.20 \pm 4.34 ^{ac}	63.17 \pm 4.83 ^c	43.01 \pm 4.47
20°C (XII)	20.77 \pm 3.84 ^b	38.07 \pm 7.84 ^a	38.47 \pm 6.71 ^a	42.07 \pm 1.51 ^a	50.70 \pm 3.48 ^a	38.01 \pm 4.68
20°C (XIV)	24.70 \pm 3.16 ^a	39.33 \pm 2.37 ^{bc}	31.57 \pm 4.83 ^{ab}	43.13 \pm 2.11 ^c	56.63 \pm 2.32 ^d	39.07 \pm 2.96
28°C (III)	54.77 \pm 1.68 ^b	79.57 \pm 1.75 ^a	81.03 \pm 1.54 ^a	80.73 \pm 2.78 ^a	93.70 \pm 1.69 ^c	77.96 \pm 1.89
28°C (XII)	40.23 \pm 2.05 ^a	38.53 \pm 1.55 ^a	48.40 \pm 2.27 ^b	44.30 \pm 2.60 ^{ab}	56.97 \pm 1.62 ^c	45.69 \pm 2.02
28°C (XIV)	39.67 \pm 2.48 ^a	42.87 \pm 1.02 ^{ab}	49.13 \pm 2.52 ^{bc}	50.27 \pm 1.62 ^c	56.80 \pm 1.39 ^d	47.75 \pm 1.81
37°C (III)	34.87 \pm 3.30 ^{ab}	29.13 \pm 6.30 ^a	28.17 \pm 3.92 ^a	45.70 \pm 3.47 ^{bc}	56.67 \pm 3.33 ^c	38.91 \pm 4.06
37°C (XII)	37.47 \pm 2.90 ^a	31.73 \pm 1.81 ^{ab}	24.83 \pm 0.80 ^b	39.53 \pm 3.25 ^a	66.70 \pm 3.29 ^c	40.05 \pm 2.41
37°C (XIV)	36.80 \pm 1.95 ^a	31.30 \pm 4.08 ^{ab}	16.53 \pm 3.59 ^b	35.73 \pm 8.70 ^a	44.67 \pm 1.92 ^a	33.01 \pm 4.05
Disulfide reductase [U cm⁻³]						
20°C (III)	0.010 \pm 0.001 ^a	0.019 \pm 0.008 ^{ab}	0.010 \pm 0.001 ^a	0.016 \pm 0.006 ^{ab}	0.026 \pm 0.005 ^b	0.016 \pm 0.003
20°C (XII)	0.013 \pm 0.005 ^a	0.013 \pm 0.005 ^a	0.019 \pm 0.001 ^a	0.019 \pm 0.008 ^a	0.013 \pm 0.005 ^a	0.016 \pm 0.004
20°C (XIV)	0.010 \pm 0.001 ^a	0.013 \pm 0.005 ^a	0.013 \pm 0.005 ^a	0.013 \pm 0.005 ^a	0.032 \pm 0.005 ^b	0.016 \pm 0.004
28°C (III)	0.010 \pm 0.001 ^a	0.013 \pm 0.005 ^a	0.013 \pm 0.005 ^a	0.019 \pm 0.008 ^{ab}	0.032 \pm 0.005 ^b	0.017 \pm 0.004
28°C (XII)	0.194 \pm 0.008 ^{ab}	0.188 \pm 0.012 ^a	0.223 \pm 0.008 ^{bc}	0.207 \pm 0.012 ^{ab}	0.256 \pm 0.012 ^c	0.214 \pm 0.010
28°C (XIV)	0.013 \pm 0.005 ^a	0.036 \pm 0.009 ^b	0.019 \pm 0.008 ^{ab}	0.026 \pm 0.005 ^{ab}	0.084 \pm 0.005 ^c	0.036 \pm 0.006
37°C (III)	0.016 \pm 0.005 ^a	0.013 \pm 0.005 ^a	0.016 \pm 0.005 ^a	0.049 \pm 0.008 ^b	0.016 \pm 0.005 ^a	0.022 \pm 0.005
37°C (XII)	0.045 \pm 0.005 ^a	0.013 \pm 0.005 ^b	0.055 \pm 0.009 ^a	0.045 \pm 0.005 ^a	0.074 \pm 0.005 ^c	0.047 \pm 0.005
37°C (XIV)	0.023 \pm 0.005 ^a	0.013 \pm 0.005 ^a	0.026 \pm 0.005 ^{ab}	0.042 \pm 0.005 ^b	0.016 \pm 0.009 ^a	0.024 \pm 0.005
Proteins and peptides [$\mu\text{g of proteins cm}^{-3}$]						
20°C (III)	214.84 \pm 10.15 ^c	397.91 \pm 21.41 ^a	434.49 \pm 28.52 ^a	516.69 \pm 13.52 ^b	507.83 \pm 28.80 ^b	414.35 \pm 20.48
20°C (XII)	228.31 \pm 2.84 ^b	460.28 \pm 20.86 ^a	442.96 \pm 35.95 ^a	503.40 \pm 29.84 ^a	499.94 \pm 26.64 ^a	426.9 \pm 23.23
20°C (XIV)	259.88 \pm 29.34 ^c	393.87 \pm 24.32 ^b	435.26 \pm 17.48 ^{ab}	491.28 \pm 17.03 ^a	488.58 \pm 1.25 ^a	413.77 \pm 17.88
28°C (III)	297.42 \pm 5.44 ^b	473.18 \pm 7.52 ^a	473.37 \pm 6.33 ^a	509.37 \pm 7.35 ^c	545.95 \pm 19.68 ^d	459.86 \pm 9.26
28°C (XII)	341.12 \pm 20.62 ^b	421.78 \pm 14.01 ^a	387.32 \pm 9.27 ^{ab}	394.06 \pm 14.68 ^a	430.25 \pm 15.16 ^a	394.91 \pm 14.75
28°C (XIV)	308.40 \pm 7.41 ^d	394.06 \pm 1.91 ^{bc}	365.19 \pm 2.37 ^a	378.85 \pm 6.48 ^{ab}	413.12 \pm 10.90 ^c	371.92 \pm 5.81
37°C (III)	333.61 \pm 17.53 ^b	413.89 \pm 12.21 ^{ab}	455.47 \pm 19.88 ^a	488.97 \pm 50.49 ^{ac}	575.79 \pm 36.55 ^c	453.55 \pm 27.33
37°C (XII)	316.87 \pm 18.58 ^a	381.55 \pm 14.84 ^a	463.56 \pm 12.80 ^b	522.08 \pm 16.58 ^{bc}	572.51 \pm 31.23 ^c	451.31 \pm 18.81
37°C (XIV)	365.96 \pm 24.33 ^a	424.28 \pm 52.95 ^a	458.17 \pm 31.46 ^{ab}	539.79 \pm 29.74 ^{bc}	596.19 \pm 26.27 ^c	476.88 \pm 32.95
Amino groups [$\mu\text{g N-NH}_2 \text{ cm}^{-3}$]						
20°C (III)	2.89 \pm 0.12 ^b	12.06 \pm 0.34 ^c	32.57 \pm 0.11 ^a	30.08 \pm 1.23 ^a	31.45 \pm 1.19 ^a	21.81 \pm 0.59
20°C (XII)	3.27 \pm 0.16 ^b	14.01 \pm 0.73 ^c	32.57 \pm 0.78 ^d	25.68 \pm 2.06 ^a	26.21 \pm 1.47 ^a	20.35 \pm 1.04
20°C (XIV)	3.04 \pm 0.17 ^b	13.05 \pm 0.53 ^c	32.03 \pm 1.37 ^a	31.30 \pm 0.92 ^a	32.51 \pm 1.39 ^a	22.39 \pm 0.87
28°C (III)	5.78 \pm 0.43 ^a	10.62 \pm 0.23 ^b	10.34 \pm 0.30 ^b	6.16 \pm 0.33 ^a	6.61 \pm 0.19 ^a	7.90 \pm 0.30
28°C (XII)	7.02 \pm 0.16 ^b	10.89 \pm 0.15 ^c	11.98 \pm 0.31 ^a	12.57 \pm 0.34 ^a	14.46 \pm 0.33 ^d	11.38 \pm 0.26
28°C (XIV)	5.37 \pm 0.31 ^b	8.32 \pm 0.24 ^a	9.15 \pm 0.28 ^a	7.32 \pm 0.17 ^c	8.42 \pm 0.32 ^a	7.72 \pm 0.26
37°C (III)	3.34 \pm 0.08 ^{ac}	1.87 \pm 0.07 ^c	4.43 \pm 0.62 ^{ab}	5.03 \pm 0.25 ^{ab}	5.73 \pm 1.03 ^b	4.08 \pm 0.41
37°C (XII)	3.40 \pm 0.14 ^a	1.94 \pm 0.13 ^a	5.39 \pm 0.49 ^b	6.66 \pm 0.65 ^{bc}	7.07 \pm 0.70 ^c	4.89 \pm 0.42
37°C (XIV)	2.52 \pm 0.15 ^a	1.38 \pm 0.04 ^a	4.04 \pm 0.20 ^b	4.88 \pm 0.69 ^{bc}	5.41 \pm 0.26 ^c	3.64 \pm 0.27

Thiol groups [$\mu\text{g -SH cm}^{-3}$]						
20°C (III)	1.60 ± 0.39 ^a	3.41 ± 0.42 ^b	1.92 ± 0.39 ^a	3.89 ± 0.20 ^b	0.96 ± 0.13 ^a	2.36 ± 0.31
20°C (XII)	4.58 ± 1.06 ^a	3.36 ± 0.86 ^a	1.97 ± 0.49 ^a	4.85 ± 0.87 ^a	9.28 ± 1.25 ^b	4.81 ± 0.91
20°C (XIV)	1.39 ± 0.20 ^{ab}	2.24 ± 0.13 ^a	0.91 ± 0.38 ^b	5.76 ± 0.52 ^c	2.45 ± 0.46 ^a	2.55 ± 0.34
28°C (III)	2.35 ± 0.15 ^a	2.99 ± 0.15 ^{ab}	6.72 ± 0.47 ^d	4.69 ± 0.15 ^c	3.95 ± 0.53 ^{bc}	4.14 ± 0.29
28°C (XII)	5.28 ± 0.13 ^{ab}	7.14 ± 0.87 ^c	3.73 ± 0.40 ^a	4.37 ± 0.33 ^a	6.13 ± 0.42 ^{bc}	5.33 ± 0.43
28°C (XIV)	4.80 ± 0.23 ^a	5.33 ± 0.33 ^a	4.53 ± 0.87 ^a	4.69 ± 0.53 ^a	4.74 ± 0.96 ^a	4.82 ± 0.58
37°C (III)	3.68 ± 0.35 ^a	2.35 ± 0.33 ^a	1.76 ± 0.26 ^a	9.01 ± 0.20 ^b	35.83 ± 1.51 ^c	10.52 ± 0.53
37°C (XII)	6.13 ± 0.59 ^a	5.81 ± 0.27 ^a	3.57 ± 0.27 ^b	9.33 ± 0.79 ^c	37.59 ± 0.91 ^d	12.49 ± 0.57
37°C (XIV)	3.52 ± 1.26 ^a	4.85 ± 1.18 ^a	20.05 ± 0.74 ^b	16.10 ± 1.10 ^b	31.67 ± 1.71 ^c	15.24 ± 1.20
Sulfate ions [$\text{mg SO}_4^{2-} \text{ cm}^{-3}$]						
20°C (III)	0.73 ± 0.01 ^c	0.64 ± 0.01 ^a	1.18 ± 0.02 ^d	0.66 ± 0.02 ^{ab}	0.70 ± 0.02 ^{bc}	0.78 ± 0.01
20°C (XII)	0.49 ± 0.02 ^a	0.70 ± 0.03 ^b	1.23 ± 0.03 ^e	0.95 ± 0.03 ^d	0.83 ± 0.02 ^c	0.84 ± 0.03
20°C (XIV)	0.90 ± 0.05 ^c	0.60 ± 0.02 ^b	1.16 ± 0.02 ^d	0.79 ± 0.03 ^a	0.75 ± 0.02 ^a	0.84 ± 0.03
28°C (III)	0.32 ± 0.03 ^a	0.95 ± 0.02 ^d	1.15 ± 0.02 ^e	0.55 ± 0.03 ^b	0.66 ± 0.03 ^c	0.73 ± 0.02
28°C (XII)	0.59 ± 0.04 ^a	0.96 ± 0.04 ^c	0.57 ± 0.03 ^a	0.17 ± 0.01 ^b	0.53 ± 0.02 ^a	0.56 ± 0.03
28°C (XIV)	0.34 ± 0.03 ^a	1.00 ± 0.06 ^b	0.91 ± 0.01 ^b	0.31 ± 0.10 ^a	0.60 ± 0.02 ^c	0.63 ± 0.04
37°C (III)	0.34 ± 0.02 ^b	0.11 ± 0.03 ^a	0.19 ± 0.02 ^a	0.16 ± 0.03 ^a	0.17 ± 0.02 ^a	0.19 ± 0.02
37°C (XII)	0.34 ± 0.01 ^b	0.08 ± 0.02 ^a	0.14 ± 0.02 ^a	0.17 ± 0.03 ^a	0.16 ± 0.04 ^a	0.18 ± 0.02
37°C (XIV)	0.26 ± 0.02 ^c	0.01 ± 0.01 ^a	0.05 ± 0.01 ^{ab}	0.05 ± 0.02 ^{ab}	0.07 ± 0.01 ^b	0.09 ± 0.01
Ammonium ions [$\mu\text{g NH}_4^+ \text{ cm}^{-3}$]						
20°C (III)	237.82 ± 16.54 ^b	636.50 ± 35.28 ^a	718.09 ± 45.27 ^a	637.65 ± 41.74 ^a	641.83 ± 18.69 ^a	574.38 ± 31.51
20°C (XII)	129.57 ± 44.24 ^b	525.24 ± 32.09 ^a	615.17 ± 42.31 ^a	523.61 ± 3.97 ^a	531.26 ± 20.45 ^a	464.97 ± 28.61
20°C (XIV)	296.00 ± 2.29 ^c	675.67 ± 37.62 ^{ab}	729.91 ± 8.54 ^b	655.97 ± 32.57 ^{ab}	635.10 ± 13.16 ^a	598.53 ± 18.84
28°C (III)	365.53 ± 7.71 ^c	637.65 ± 9.38 ^a	620.27 ± 23.04 ^a	558.61 ± 7.19 ^b	598.95 ± 12.50 ^{ab}	556.20 ± 11.96
28°C (XII)	525.24 ± 7.75 ^b	687.03 ± 8.92 ^a	677.99 ± 5.42 ^a	555.37 ± 9.20 ^c	593.61 ± 10.50 ^d	607.85 ± 8.36
28°C (XIV)	460.33 ± 14.23 ^b	646.23 ± 2.29 ^a	668.71 ± 11.49 ^a	531.49 ± 8.98 ^c	578.08 ± 6.02 ^d	576.97 ± 8.60
37°C (III)	66.52 ± 3.69 ^a	111.95 ± 9.01 ^a	110.80 ± 20.16 ^a	98.05 ± 9.95 ^a	188.21 ± 20.96 ^b	115.11 ± 12.75
37°C (XII)	66.29 ± 7.19 ^a	109.40 ± 4.76 ^{bc}	138.38 ± 10.36 ^c	89.93 ± 10.50 ^{ab}	180.80 ± 10.09 ^d	116.96 ± 8.58
37°C (XIV)	12.28 ± 1.73 ^b	28.28 ± 3.78 ^{ab}	30.60 ± 4.54 ^{ab}	41.26 ± 12.62 ^a	46.13 ± 3.28 ^a	31.71 ± 5.19

Explanations: as in Table S1.

ST (III)	365.53 ± 7.71 ^c	637.65 ± 9.38 ^a	620.27 ± 23.04 ^a	558.61 ± 7.19 ^b	598.95 ± 12.50 ^{ab}	556.20 ± 11.96
ST (XII)	525.24 ± 7.75 ^b	687.03 ± 8.92 ^a	677.99 ± 5.42 ^a	555.37 ± 9.20 ^c	593.61 ± 10.50 ^d	607.85 ± 8.36
ST (XIV)	460.33 ± 14.23 ^b	646.23 ± 2.29 ^a	668.71 ± 11.49 ^a	531.49 ± 8.98 ^c	578.08 ± 6.02 ^d	576.97 ± 8.60
AG (III)	217.19 ± 18.78 ^b	256.59 ± 29.81 ^b	423.25 ± 39.92 ^a	433.68 ± 42.91 ^a	457.32 ± 46.90 ^a	357.61 ± 35.66
AG (XII)	319.17 ± 29.34 ^b	411.43 ± 10.73 ^a	454.31 ± 11.27 ^a	417.92 ± 13.35 ^a	392.42 ± 37.65 ^a	399.05 ± 20.47
AG (XIV)	276.06 ± 24.59 ^b	427.88 ± 10.23 ^a	434.37 ± 22.21 ^a	403.31 ± 6.40 ^a	392.19 ± 10.33 ^a	386.76 ± 14.75

Explanations: as in Table S1.