

Table (2): Effect of feed restriction and different supplemental zinc forms on productive performance traits of laying hens from 24 to 48 weeks of age.

Items	BW change(g)	Egg weight (g)	Egg number	Egg mass (g/d)	DFI (g/d)	TFI (kg)	FC (g feed /g egg mass)	FC(kg feed / eggs)	EPR %	
Feeding system										
<i>ad libitum</i>	335.00± 14.75 ^a	49.34± 0.12 ^a	104.1± 0.9 ^a	30.57± 0.85 ^a	118.93± 0.37 ^a	19.98± 0.06 ^a	3.92± 0.11 ^a	5.21± 0.14 ^b	61.96± 1.64 ^a	
90%	283.89± 15.89 ^b	48.94± 0.20 ^{ab}	99.6± 0.72	29.17± 0.78 ^b	107.56± 0.19 ^b	18.07± 0.03 ^b	3.71± 0.10 ^b	5.54± 0.13 ^a	59.62± 1.48 ^b	
80%	230.00± 19.54 ^c	48.21± 0.12 ^b	88.83± 0.46 ^c	24.47± 0.54 ^c	95.78± 0.18 ^c	16.09± 0.18 ^c	3.93± 0.08 ^a	5.30± 0.11 ^{ab}	50.79± 1.07 ^c	
Sig. test	**	**	**	**	***	***	**	*	**	
Zinc forms01±										
Un-supplemented	246.94± 17.07 ^b	48.59± 0.25	90.15± 0.67 ^c	25.65± 0.84 ^c	107.15± 3.38	18.00± 0.57	4.18± 0.07 ^a	4.93± 0.08 ^c	52.77± 1.54 ^c	
50mg Nano-zinc	321.11± 18.89 ^a	49.08± 0.19	103.05± 1.01 ^a	30.34± 1.05 ^a	107.78± 3.37	18.11± 0.57	3.56± 0.04 ^c	5.74± 0.07 ^a	61.81± 1.94 ^a	
50 mg organic zinc	280.83± 23.42 ^{ab}	48.81± 0.19	98.79± 0.77 ^b	28.22± 0.99 ^b	107.33± 3.30	18.03± 0.55	3.81± 0.05 ^b	5.39± 0.06 ^b	57.80± 1.86 ^b	
Sig. test	**	NS	**	**	NS	NS	**	**	**	
Interaction effect										
<i>ad libitum</i>	0	294.17± 2043 ^{bcd}	49.14± 0.35 ^{abc}	95.01± 1.27 ^c	27.80± 1.25 ^c	118.78± 0.62 ^a	19.95± 0.10 ^a	4.29± 0.19 ^a	4.76± 0.19 ^d	56.55± 2.27 ^c
	Nano-Zn	376.67± 18.33 ^a	49.55± 0.12 ^a	112.02± 0.49 ^a	33.03± 0.35 ^a	119.44± 0.29 ^a	20.07± 0.05 ^a	3.93± 0.08 ^b	5.58± 0.09 ^b	66.69± 0.88 ^a
	Or-Zn	334.17± 12.44 ^{ab}	49.32± 0.05 ^{ab}	105.27± 0.28 ^b	30.89± 0.21 ^b	118.56± 0.99 ^a	19.92± 0.17 ^a	4.18± 0.07 ^a	5.29± 0.06 ^b	62.66± 0.51 ^b
90%	0	250.00± 7.64 ^{cde}	48.63± 0.48	91.29± 0.15 ^d	26.43± 0.14 ^{cd}	107.22± 0.40 ^b	18.01± 0.07 ^b	3.56± 0.04 ^c	5.07± 0.01 ^c	54.35± 0.27 ^c
	Nano-Zn	308.33± 29.49 ^{abc}	49.32± 0.10 ^{ab}	104.88± 0.83 ^b	31.73± 0.32 ^b	107.78± 0.40 ^b	18.11± 0.07 ^b	3.81± 0.05 ^b	5.98± 0.08 ^a	64.40± 0.79 ^b
	Or-Zn	293.33± 34.44 ^{bcd}	48.87± 0.31 ^{abcd}	101.01± 0.03 ^{bc}	29.35± 0.22 ^b	107.67± 0.19 ^b	18.09± 0.03 ^b	4.29± 0.19 ^a	5.58± 0.02 ^b	60.12± 0.06 ^b
80%	0	196.67± 25.22 ^c	48.01± 0.31 ^e	84.12± 0.58 ^e	22.74± 0.28 ^c	95.44± 0.29 ^c	16.03± 0.05 ^c	3.62± 0.05 ^{cd}	4.97± 0.09	47.42± 0.80 ^d
	Nano-Zn	278.33± 23.15 ^{bcd}	48.37± 0.09 ^{bcd}	92.28± 0.25 ^d	26.27± 0.23 ^{cd}	96.11± 0.29 ^c	16.15± 0.05 ^c	3.84± 0.04 ^{bc}	5.65± 0.04 ^b	54.33± 0.56 ^c
	Or-Zn	215.00± 39.69 ^{de}	48.13± 0.25 ^{de}	90.06± 0.40 ^{de}	24.41± 0.43 ^d	95.78± 0.29 ^c	16.09± 0.05 ^c	4.06± 0.04 ^b	5.29± 0.12 ^b	50.63± 0.9
Sig. test	**	**	**	**	***	***	**	**	**	

a, b, c: Means in each classification in the same column with different superscripts, differ significantly (P<0.05), N.S: Not Significant, * P < 0.05, ** P< 0.01, ***P < 0.001, BW: Body weight, DFI: Daily feed intake, TFI: Total feed intake, FC: Feed conversion, EPR Egg production rate

Table (4): Economic Efficiency as affected by feed restricted system and zinc forms and their interaction

Items	Egg number	Price/egg (LE)	Total revenue eggs (LE)	Total feed intake (kg)	Price/Kg feed (LE)	Total feed cost (LE)	Fixed (LE)	Total cost (LE)	Net revenue (LE)	EEf (%)	
<i>Feeding restricted system</i>											
<i>ad libitum</i>	104.1	1.5	156.15	19.98	9.05	180.81	3	183.81	-24.66	-13.42	
90%	100.17	1.5	150.26	18.07	9.05	163.53	3	166.53	-13.27	-7.97	
80%	85.33	1.5	128.00	16.09	9.05	145.62	3	148.62	-17.63	-11.86	
<i>Zinc forms</i>											
0	88.66	1.5	132.99	18.00	6.00	108.01	3	111.01	24.98	22.51	
Nano-Z	103.83	1.5	155.75	18.11	15.00	271.60	3	274.60	-115.86	-42.19	
O-Z	97.11	1.5	145.67	18.03	6.15	110.90	3	113.90	34.77	30.53	
<i>Interaction effect</i>											
Ad libitum	0	95.00	1.5	142.50	19.95	6.00	119.73	3	122.73	22.77	18.55
	N-Z	112.03	1.5	168.05	20.07	15.00	301.00	3	304.00	-132.96	-43.74
	O-Z	105.27	1.5	157.90	19.92	6.15	122.49	3	125.49	35.41	28.22
90%	0	91.30	1.5	136.95	18.01	6.00	108.08	3	111.08	28.87	25.99
	N-Z	108.20	1.5	162.30	18.11	15.00	271.60	3	274.60	-109.30	-39.80
	O-Z	101.00	1.5	151.50	18.09	6.15	111.24	3	114.24	40.26	35.24
80%	0	79.67	1.5	119.51	16.03	6.00	96.21	3	99.21	23.30	23.48
	N-Z	91.27	1.5	136.91	16.15	15.00	242.20	3	245.20	-105.30	-42.94
	O-Z	85.07	1.5	127.61	16.09	6.15	98.95	3	101.95	28.66	28.11

Table (4): Economic Efficiency as affected by feed restricted system and zinc forms interaction

Items	Egg number	Price/egg (LE)	Total revenue eggs (LE)	Total feed intake (kg)	Price/Kg feed (LE)	Total feed cost (LE)	Fixed (LE)	Total cost (LE)	Net revenue (LE)	EEf (%)	
<i>Interaction effect:</i>											
Ad Lib.	0	95.00	1.5	142.50	19.95	6.00	119.73	3	122.73	22.77	18.55
	N-Z	112.03	1.5	168.05	20.07	15.00	301.00	3	304.00	-132.96	-43.74
	O-Z	105.27	1.5	157.90	19.92	6.15	122.49	3	125.49	35.41	28.22
90%	0	91.30	1.5	136.95	18.01	6.00	108.08	3	111.08	28.87	25.99
	N-Z	108.20	1.5	162.30	18.11	15.00	271.60	3	274.60	-109.30	-39.80
	O-Z	101.00	1.5	151.50	18.09	6.15	111.24	3	114.24	40.26	35.24
80%	0	79.67	1.5	119.51	16.03	6.00	96.21	3	99.21	23.30	23.48
	N-Z	91.27	1.5	136.91	16.15	15.00	242.20	3	245.20	-105.30	-42.94
	O-Z	85.07	1.5	127.61	16.09	6.15	98.95	3	101.95	28.66	28.11

Total revenue eggs (LE)= egg number x Price/ egg (LE), Net revenue (LE)= Total revenue eggs (LE) – total cost, EEf = Economic efficiency (EEF) = Net revenue (LE) / Total cost (LE) x 100, Price of Nano Zn .supplement = 9.0(LE), Price Of Org-Zn= 0.15 (LE).

